Ingersoll-Rand Company
Woodcliff Lake, New Jersey

Baseline Ecological Evaluation of the South-Side Area Ingersoll-Rand Facility Phillipsburg, New Jersey

Text and Appendices

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ENSR Corporation
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1.0 INTRODUCTION

A Baseline Ecological Evaluation (BEE) was conducted by ENSR on behalf of Ingersoll-Rand Company (IR) at the southern portion (South-Side Area) of the IR property, located at 942 Memorial Parkway, Warren County, Phillipsburg, New Jersey. The BEE was conducted in accordance with the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program's Technical Requirements for Site Remediation (N.J.A.C. 7:26E). The South-Side Area of the IR property, hereafter referred to as the "Site" and shown on Figure 1, is currently under consideration for purchase and redevelopment by the Town of Phillipsburg.

The BEE is part of a tiered approach to ecological risk assessment and is conducted by qualified individuals using qualitative screening techniques. The guidance for conducting BEEs (NJDEP, 1997) provides methods to define Contaminants of Potential Ecological Concern (COPECs) and Environmentally Sensitive Areas (ESAs), and to assess potential contaminant migration pathways. The results of the BEE are then used to assess whether a comprehensive ecological assessment under N.J.A.C. 7:26E-4.7 is needed.

Prior to conducting site visits, general environmental information on the site vicinity was obtained from existing reports. ENSR conducted site visits on April 4, 2002 and April 9, 2002 to document site flora and fauna, to assess potential contaminant migration pathways from previously identified Areas of Concern (AOCs), and to determine whether these migration pathways could transport contaminants to ESAs. Photographs were taken during the site visit to document the natural resources at the site and adjacent areas and are included as Appendix A.

1.1 Background and History

1.1.1 General History

As shown in Figure 1, the entire IR property encompasses a total of 385 acres within the Town of Phillipsburg and Lopatcong Township, New Jersey. The facility history dates back to the early 1900s when initial construction began. Since its construction, the portions of the property has been used for manufacturing and related operations, agriculture, and landfilling, with some portions of the property having been left unimproved. The property is developed with manufacturing and related buildings, roads and parking areas, landscaped areas, and agricultural fields. Sections of the property appear to be forested and/or overgrown fields including a former company baseball field. Finally, two large landfill areas are present just south of the main facility area, one of which was closed in 1981 and one of which remains active. A Property Overview Map including the boundaries of the Site is included as Figure 2.

Manufacturing operations have generally remained centralized in the northwest quadrant of the property. During the height of operations, the facility employed almost 5,000 employees and produced several major product lines including pumping equipment, mining equipment, turbo equipment, air and gas compressors, and rock drilling equipment. Iron and steel foundries located on the property supported these operations. Buildings were both built and demolished to meet varying production needs over the facility history. Due to a later restructuring and the resulting formation of the Ingersoll-Dresser Pump Company joint venture, all of the divisions other than the manufactured pump division were removed from the property including the Cameron Pump Division which was formerly located on the Site. Recently, Ingersoll-Dresser Pump operations were acquired by Flowserve Corporation, who continues pump manufacturing operations in the northern portion of the property. Currently, no manufacturing activities occur in the southern portion of the property, the "Site".

Agricultural operations have been present on the eastern and southern portions of the site with operations leased to local farmers. Landfill operations occurred just south of the main plant in the "Old Landfill" and the "New Landfill". The Old Landfill received mainly foundry sand and construction debris as well as various plant waste materials until its closure in 1981. The New Landfill, present to the west of the Old Landfill, remains active for disposal of foundry sand and construction debris, although nothing has been disposed there for several years.

The facility has been actively engaged in remediation since 1986 and has been under NJDEP oversight under an Administrative Consent Order (ACO) since 1994.

1.1.2 Site Operational History

Historic operations in the South-Side Area of the facility included pump manufacturing, landfilling, and agriculture. Manufacturing operations were limited to the Cameron Pump Division located on the westernmost portion of the Site. Landfilling operations took place just to the east of the former Cameron Pump facility. The remaining portions of the Site have been used for agricultural purposes or left unimproved. A Site Plan is provided as Figure 3.

Material used by manufacturing activities and wastes created were predominately foundry sand, oils and lubricants, and metal cuttings. Additionally, equipment containing polychlorinated biphenyls (PCBs) – including capacitors and transformers – have been used at the site. According to facility sources, all PCB-containing transformers and capacitors have been removed from the site.

1.2 Site Description

The Site is located directly south of the main plant area of the IR property and consists of approximately 177 acres and is bordered by residential development, farmland, roadways, and the main plant area. Land use consists of agriculture, landfill operations, abandoned manufacturing area, and forested upland areas. An abandoned company baseball field is also present toward the

southwest corner of the Site and an Ephemeral Stream is located within the central portion of the Site. The Ephemeral Stream runs southwest approximately 2,100 feet to its confluence with Lopatcong Creek, which flows southwest along the eastern edge of the Site toward the Delaware River.

Several environmental investigations have been conducted at the Site since 1982 including assessments of both groundwater and soil quality. From these previous investigations, seven recognized or potential AOCs were identified. Table 1 summarizes each of the AOCs, including contaminants identified in excess of NJDEP Soil Cleanup Criteria, and current regulatory status. As indicated in Table 1, five of the original seven AOCs (3A, 3B, 6, 8, and 26) have received No Further Action determinations by NJDEP.

ENSR's May 2001 Remedial Investigation Report (RIR) and January 2002 RIR Addendum summarizes activities conducted in relation to South-Side Area AOCs 3A, 3B, 26, 29, 31 and 37. While the reports include data regarding the Inverse Ponds (AOC 31), this AOC is not part of the Site that is being considered for redevelopment and is not discussed in this report.

AOCs within the South-Side Area are as follows:

- AOC 3A – Former metal chip pad located on the former Cameron Pump area of the site;
- AOC 3B – Former metal chip pad located on the former Cameron Pump area of the site;
- AOC 6 – Cameron Coolant Disposal Area;
- AOC 8 – Former 500-Gallon Gasoline UST;
- AOC 26 – Former 2,000-Gallon Waste Oil UST;
- AOC 29 – Old Landfill; and
- AOC 37 – Ephemeral Stream.

The following subsections describe the AOCs reviewed as part of this BEE.

1.2.1 AOCs 3A and 3B – Former Metal Chip Storage Pads

As shown on Figure 3, AOC 3A is located at the eastern end of the former Cameron pump facility. This location is a former metal chip storage pad previously used for the temporary storage of metal chips generated from machining operations. AOC 3A is currently an open, unused area near the west side of the Site. It is approximately 200 feet long (along its north-south axis) by 90 feet wide. The surface of AOC 3A is covered partly by a concrete pad and partly covered by gravel over bare ground. Generally, below the gravel or pavement there is 6 to 8 inches of sand fill overlying yellow or orange silts.

As shown on Figure 3, AOC 3B is located at the southwest corner of the South-Side Area. This area, also formerly used to store metal chips from machining operations, is currently an open, unused area approximately 120 feet long (along its north-south axis) by 80 feet wide. The surface of AOC 3B is

entirely covered by asphalt. Generally, below pavement and sub-base gravel is yellow silt, occasionally overlain by sand fill.

Activities in these areas have been reported in ENSR's May 2000 Site/Remedial Investigation Report, May 2001 Site/Remedial Investigation Report, and January 2002 Remedial Investigation Report Addendum. Based on the findings of these reports, NJDEP granted No Further Action (NFA) approvals for each of these AOCs in their May 2002 letter.

1.2.2 AOC 6 – Cameron Coolant Disposal Area

As reported in ENSR's May 2001 Site/Remedial Investigation Report and January 2002 Remedial Investigation Report, the former Cameron Coolant disposal area has not been located. Based on the inability to locate and sample this AOC, NJDEP has granted a conditional NFA.

1.2.3 AOC 8 – Former 1,000-Gallon Gasoline UST

As shown on Figure 3, AOC 8 is located on the western boundary of the site. The UST was removed in April 1996 by excavation and offsite disposal. Activities were reported in ENSR's 1996 UST Closure and Site Investigation Report. Based on the findings of this report, AOC 8 was granted NFA approval by NJDEP via their January 23, 1997 letter.

1.2.4 AOC 26 – Former 2,000 Gallon Waste Oil UST

AOC 26 is located adjacent to AOC 3A at the western portion of the site (see Figure 3). This 2,000-gallon waste oil UST was removed in March 1986 under the NJDEP approved closure plan dated October 23, 1985. Confirmatory sampling was conducted in February 2001 and documented in ENSR's May 2001 Site/Remedial Investigation Report. Based on the findings of that report, NJDEP granted NFA approval via their May 14, 2002 letter.

1.2.5 AOC 29 – Old Landfill

The "Old Landfill" is shown on Figure 3 located to the southeast of the facility's main manufacturing area. As previously stated, the Old Landfill was used to dispose of foundry sand, construction debris, and various manufacturing wastes. The landfill area was originally a naturally occurring low-lying area with a general slope and drainage to the south-southeast. The landfill now creates a flat terrace, extending southeast from the manufacturing buildings (see Appendix A for photos). The Old Landfill is approximately 20 acres in size and has not been used as a disposal site since 1981. It is approximately 10 feet thick at the northern end and increases to approximately 40 feet at the edge of the terrace. Activities in this AOC have been reported in May 2001 Site/Remedial Investigation Report and January 2002 Remedial Investigation Report Addendum. Based on the findings of these reports, a NFA has been requested with the institution of a Deed Notice.

1.2.6 AOC 37 – Ephemeral Stream

As shown on Figure 3, the Ephemeral Stream is located in the central portion of the South-Side Area and receives water from two lined Inverse Ponds (Upper Pond and Lower Pond) which are located on the eastern side of facility buildings just north of the Site. The Lower Pond discharges into the Ephemeral Stream under a NJPDES outfall monitored under the facility's discharge to surface water permit (NJPDES Permit 0004049, outfall DSN001A). The Ephemeral Stream then meanders from the Lower Inverse Pond discharge point approximately 2100 feet to its confluence with Lopatcong Creek.

During ENSR's site investigation, the Ephemeral Stream was dry at the discharge point into the Lopatcong Creek. However, the Ephemeral Stream was free flowing at the point of intersection with the inverse pond. The point at which the stream ceased flowing could not be determined during the site visit, due to the over-grown vegetation surrounding the stream (see photos in Appendix A). The lack of discharge from the Ephemeral Stream into the Lopatcong Creek may be attributed to infiltration and evaporation as well as a severe drought, which was nearing its peak during ENSR's site investigation in April 2002.

Investigation at this AOC was conducted in February and March of 2001 with findings reported in ENSR's May 2001 Site/Remedial Investigation Report and January 2002 Remedial Investigation Report Addendum. Based on the findings of these reports, NJDEP approved NFA via their March 11 2002 letter.

1.3 Adjacent Areas

The area surrounding the Site consists of residential, commercial, and industrial development. In addition, a forested area borders the Site to the southeast. Residential development borders the west and southwest portion of the Site. Tracts of farmland adjoin the site to the northeast and to the south and to the east, beyond Route 22. The main plant area of the facility is located to the north of the Site. The Lopatcong Creek flows through the southeast portion of the site and heads in a southwesterly direction, towards the Delaware River. The Delaware River is located approximately one-half mile from the Site.

1.4 Site Drainage and Discharges

The IR property is situated at the crest of a hill causing surface runoff to flow west to southwest in the western portion of the property and east to southeast on the eastern part of the property. A stormwater collection system present in current and former manufacturing areas conveys stormwater from the western portion of the property to the Stormwater Retention Pond located at the northwest corner of the property. Stormwater on the eastern side of the facility areas is routed to the Spray Pond.

Since much of the South-Side Site are agricultural fields and vegetated land, much of the stormwater is expected to infiltrate into ground surface. Excess flow will typically follow the site gradient to the south or southeast. Stormwater catch basins in the former Cameron Pump Area and the New Landfill transport stormwater to the Stormwater Retention Pond in the northwestern corner of the property.

As previously noted, an Ephemeral Stream is located near the center of the Site. This stream accepts discharge water from the Inverse Ponds located in the main plant portion of the property and is monitored under a discharge to surface water (DSW) permit. The Inverse Ponds receive water via an underground pipe from the Spray Pond, which is designed to facilitate the chemical adjustment of stormwater, recovery well water, non-contact cooling water, and process water prior to discharge under the facility DSW permit (NJPDES DSW Permit No. NJ0004049).

1.5 Field Observations – April 2002

ENSR conducted site visits during April 2002 to complete the BEE. During each site visit, ENSR personnel reviewed typical vegetation and wildlife to field-confirm the presence or absence of any threatened or endangered species, identified environmentally sensitive areas, and reviewed each active AOC to assess the potential for contaminant migration to identified ESAs. The next subsections discuss specific observations made during the site visits regarding vegetation and wildlife while the following Sections discuss identified ESAs (Section 2.0), COPECs (Section 3.0), and migration pathways (Section 4.0).

1.5.1 Site Vegetation

Field observations indicate that vegetation within the Site ranges from open fields to early successional forests. The perimeter of the area includes fencing, cornfields, forested boundaries and dirt roadways. The area is dominated by shrub and herbaceous species intermingled with early successional forested areas connected with landscaped areas. Typical overstory vegetation in this area consists of black cherry (*Prunus serotina*), tree-of-heaven (*Ailanthus altissma*), American sycamore (*Platanus occidentalis*), big tooth aspen (*Populus tremuloides*), staghorn sumac (*Rhus typhina)*, and silver maple (*Acer saccharrium*), with various herbaceous vegetation including crab grass (*Digitaria sp.*), yellow foxtail (*Alopecurus sp.*), perennial ryegrass (*Lolium perenne*), and sweet goldenrod (*Solidago sp.*). Table 2 presents a list of vegetation observed at the site during the April 2002 site inspections.

1.5.2 Site Wildlife

Wildlife observed during the site visits of April 2002 included various birds as well as small mammals. Abundant bird species observed within the area of Ephemeral Stream included Canada goose (*Branta canadensis*), Northern cardinal (*Cardinalis cardinalis*), Blue jay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), Northern mockingbird (*Mimus polyglottos*), and Northern Flicker (*Colaptes auratus*). Several Eastern garter snakes (*Thamnophis s. sirtalis*) were also observed within and

around the Ephemeral Stream as well as mallards, Canada geese, and a woodchuck (*Marmota monax*). Table 3 presents a complete list of the wildlife species observed at the site.

2.0 ENVIRONMENTALLY SENSITIVE AREAS (ESAS)

In accordance with N.J.A.C. 7:26E-3.11, ESAs are to be identified as part of the BEE. Identification of ESAs was conducted in accordance with the ESA Guidance Document (NJDEP, 1996). Table 4 summarizes the results of the ESA investigation and identified ESAs are shown on Figure 3. The following presents a discussion of those areas that were identified as ESAs or potential ESAs.

2.1 Surface Water

As previously discussed, an Ephemeral Stream and a portion of Lopatcong Creek are located within the Site boundaries. Lopatcong Creek, as shown in photographs in Appendix A, is a small stream that runs through the southeastern portion on the Site on its way to the Delaware River. Based on the definition of surface water in N.J.A.C.7.7E-4.1, it appears that Lopatcong Creek is considered surface water and is therefore an ESA for the purposes of this BEE.

The Ephemeral Stream, however, is a manmade drainage ditch that serves as the discharge culvert from the Inverse Ponds to Lopatcong Creek. Discharge water is monitored under NJPDES Permit No. 0004049. Often, due to lack of discharge, the Ephemeral Stream is dry or partially dry and does not meet the definition of surface water in N.J.A.C.7.7E-4.1. Therefore, the Ephemeral Stream is not considered as surface water for purposes of this BEE.

Surface water in immediately adjacent areas include the Upper and Lower Inverse Ponds, which are located just north of the Site. Although these are man-made ponds designed as final settling basins and to prevent oil discharge, they occur in a wooded area that may support small wildlife communities. Therefore, for the purposes of this BEE, the Inverse Ponds were considered a potential ESA.

2.2 Wetlands

Prior to conducting the onsite portion of the investigation, several sources were consulted to assess the area for the presence of wetlands including the Topographic Quadrangle Map for Easton PA, NJ and the associated wetlands data from NJDEP GIS Resource Data (1996) and the National Wetlands Inventory (NWI) Maps. Based on a review of these maps and data, several areas were flagged as potential wetland including the area surrounding the Ephemeral Stream and a portion of the banks of Lopatcong Creek.

On March 21, 2002 a presence/absence study of wetlands and State open waters was conducted at the site. The determination of the presence or absence of wetlands was based on observations made of vegetation, hydrology, and soils where possible. It was determined that the area mapped as PSS1A (Deciduous Scrub/Shrub) wetlands in the 1996 NJDEP GIS Resource Data exists in a thin band running parallel to the Ephemeral Stream, which flows from the inverse ponds. This area is thickly

vegetated and is dominated by multiflora rose (*Rosa multiflora*). Additionally, it was concluded that the area mapped as MODAg (Modified Agricultural) wetlands along the Lopatcong Creek is not present as it did not exhibit typical wetland hydrology, vegetation, or soils. A review of the National Wetland Inventory Map (Easton, PA-NJ, 1977) shows a Palustrine Scrub/Shrub Deciduous Emergent (PSS1/EM) wetland at the southeastern corner of the property (adjacent to the Lopatcong Creek). Field observations did not confirm the presence of wetland vegetation, soil, or hydrology in this area.

2.3 Wildlife and Habitat

Inquiries were made to the New Jersey Natural Heritage Program (NJNHP) and the U.S. Fish and Wildlife Service (USFWS) regarding the potential presence of threatened or endangered species. The response letter from the NJNHP, dated April 16, 2002 indicated that no records existed for rare animals or natural communities on the Site. The response letter from the USFWS, dated April 29, 2002, indicated that except for an occasional transient bald eagle (*Halieaeetus leucocephalus*), no other federally listed or proposed threatened or endangered fauna are known to occur within the vicinity of the site.

As discussed in Section 1.5, various fauna were observed during ENSR's field investigation and are expected to be present at the site. However, none of the observed or expected species present at the site are listed as threatened or endangered, and there is no evidence that the site is breeding ground, migratory stopover, or wintering area. Therefore no ESAs were defined based on wildlife or habitat.

2.4 Vegetation

Inquiries were made to the New Jersey Natural Heritage Program (NJNHP) and the U.S. Fish and Wildlife Service (USFWS) regarding the potential presence of threatened or endangered species. The response letter from the NJNHP, dated April 16, 2002 indicated that no records existed for rare plants on the Site. The response letter from the USFWS, dated April 29, 2002, indicated that no federally listed or proposed threatened or endangered flora are known to occur within the vicinity of the site.

As discussed in Section 1.5 various flora were observed during ENSR's site investigation. However, no threatened or endangered species were identified, and the site does not contain contiguous forest or state wilderness areas. Therefore no ESAs were defined at the site based on vegetation.

3.0 COMPOUNDS OF POTENTIAL ECOLOGICAL CONCERN (COPECs)

Based on previous investigations in the South-Side Area AOCs, compounds which have been reported in excess of the most stringent soil cleanup criteria include PCBs in AOC 3A and 3B; total petroleum hydrocarbons (TPH), base-neutral organic compounds (BNs) – specifically Polycyclic aromatic hydrocarbons (PAHs), PCBs, and Metals in AOC 29; and arsenic in AOC 37. The following subsections details the compounds of concern at each AOC.

3.1 AOCs 3A and 3B – Former Metal Chip Storage Pads

Based on the May 2000 and May 2001 Site/Remedial Investigation Reports and the January 2002 Remedial Investigation Report Addendum, original investigative soil samples collected in AOC 3A contained PCB concentrations in excess of soil cleanup criteria at one location and thallium concentrations in excess of soil cleanup criteria at eleven locations. Sample locations are shown on Figure 4 and analytical results for PCB and thallium are presented in Table 5. At the recommendation of the NJDEP, additional soil samples were analyzed for thallium using atomic absorption (AA) rather than inductively coupled plasma (ICP), as there was the potential for matrix interference. Results from the reanalysis indicated that thallium was not present in appreciable amounts and was not a compound of concern. A more detailed discussion of the differences in reported thallium concentrations via AA and ICP can be found in ENSR's May 2001 Remedial Investigation Report.

Through additional soil sampling and excavation, PCBs were delineated and removed from AOC 3A in an area 23.5 feet by 15 feet by approximately 6.5 feet. Figure 4 details the area of excavation and associated soil analytical results.

Initial soil analytical results from AOC 3B reported one location in which thallium concentrations exceeded soil cleanup criteria. As previously discussed, reanalysis using AA confirmed that thallium was not present in excess of soil cleanup criteria and is not a compound of concern. Sample results for thallium are shown in Table 6 and a more detailed discussion of the differences in reported thallium concentrations via AA and ICP is included in ENSR's May 2001 Remedial Investigation Report

3.2 AOC 6 – Cameron Coolant Disposal Area

As previously discussed, this potential AOC has not been located and has received a conditional NFA. As such, this AOC has not been sampled and no COPECs have been identified.

3.3 AOC 8 – Former 1,000 Gallon Gasoline UST

As discussed in Section 1.2.3, the 1,000-gallon gasoline UST at this AOC was removed in April 1996. As reported in the UST Closure and Site Investigation Report (ENSR, 1996), six post-excavation soil

samples were collected and analyzed for volatile organic compounds (VOCs) and lead. Analytical results did not report any compound at concentrations in excess of the NJDEP Soil Cleanup Criteria. Therefore, no COPECs were defined for this AOC.

3.4 AOC 26 – Former 2,000 Gallon Waste Oil UST

As previously discussed in Section 1.2.4, this UST was removed in 1986. To confirm the results of the previous closure activities ENSR collected four soil samples at the former tank invert elevation. All samples were analyzed for TPH and one was analyzed for VOC, BN, PCB, and metals. As reported in the May 2001 Site/Remedial Investigation Report, no compounds were detected at concentrations greater than the NJDEP Soil Cleanup Criteria. Therefore, no COPECs were defined for this AOC.

3.5 AOC 29 – Old Landfill

As shown on Figure 3, the old landfill is located to the southeast of the facility's manufacturing building area. During the summer of 1982, a hydrogeologic investigation was conducted based on a work plan approved by the NJDEP. The evaluation, included in the January 5, 1983 *Report on the Hydrogeologic Evaluation of the IR Phillipsburg Landfill*, concluded that the landfill does not present a surface or groundwater contamination potential.

As part of the 1982 investigation soil sampling was conducted. Soil samples were obtained from 5 test pits spread across the landfill area and water samples were collected from monitoring wells. The test pits were excavated to a depth of 14 feet. All of the pits contained foundry sand and all but one contained construction debris.

To further characterize the landfill, a soil boring program was initiated in February 2001. Split spoon sampling conducted throughout the landfill indicated that the fill material encountered was predominantly foundry sand. Construction debris (wood, concrete, metal, etc.) and other wastes were also reported in the soil boring logs. Samples collected for analysis from these boring locations were analyzed for priority pollutant compounds (PP+40). Analytical results for these samples were detailed in the May 2001 RIR. Results reported concentrations of TPH, PAHs, PCBs, and metals in excess of NJDEP Soil Cleanup Criteria sporadically throughout the landfill. Figure 5 shows sample locations and Table 7 presents analytical results for these compounds.

Additional soil samples were collected in May 2001 to define the perimeter of the Old Landfill. These samples, shown on Figure 5 defined both the extent of foundry sand fill material as well as the extent of the known contamination within the Old Landfill. Pertinent analytical results from these samples are also presented on Table 7.

3.6 AOC 37 – Ephemeral Stream

The ephemeral stream, as discussed in Section 1.2.7, is located in the central portion of the South-Side Area, east of the Old Landfill and south of the Inverse Ponds. The ephemeral stream receives discharges from the inverse ponds, which in turn receives discharge from the Spray Pond, which receives stormwater, recovered groundwater, non-contact cooling water, etc.

Sampling of the Ephemeral Stream was conducted on February 16, 2001, in accordance with the RIWP Addendum dated June 1994. Two sediment samples were collected for full Target Analyte List (TAL), and Target Compound List (TCL) analysis, and total organic carbon analysis. Additionally, one sample was submitted for grain size analysis. As shown on Figure 6, samples were collected from the base of ditch that comprises the Ephemeral Stream. Soil analytical results detailed in the May 2001 Site/Remedial Investigation Report and January 2002 Remedial Investigation Report Addendum indicated that arsenic was identified at one sample location in excess of NJDEP Soil Cleanup Criteria. Arsenic results for this AOC are presented in Table 8.

In May 2001, ENSR recommended collection of three additional sediment samples to further evaluate an exceedance of arsenic at sample location A37-2-A, which was not supported by a duplicate sample. One sample to verify current results, one sample located approximately 25 feet upstream, and one sample 50 feet downstream to provide additional data. The results, discussed in the January 2002 Remedial Investigation Report Addendum and shown on Table 8, reported that each of the samples reported arsenic at concentrations below the soil cleanup criteria. Based on these results the January 2002 report concluded that the original sample (A37-2-A) was likely an anomaly and that all other samples collected in the Ephemeral Stream and in other areas of the Site had reported arsenic concentrations within the range of normal arsenic background concentrations in New Jersey. As such, it was determined that arsenic was not a COPEC at this AOC.

4.0 CHEMICAL MIGRATION PATHWAYS

A critical component of the BEE is the identification and evaluation of potential contaminant migration pathways from AOCs to ESAs. Potential contaminant migration pathways are the means by which COPECs, or Contaminants of Concern (COCs) come into contact with ESAs. In the absence of a complete contaminant migration pathway, there is no risk posed to ESAs. In other words, in cases where COPECs or COCs have been identified at a given AOC, there is little or no risk to sensitive natural resources, including ESAs, if viable pathways do not exist for the COCs to move from the AOC to the sensitive natural resources.

Several potential mechanisms exist at the Site for contaminant migration. The primary contaminant migration pathways at the Site would include soil erosion, overland flow during storm events, and stormwater flow through drainage swales, ditches, and various conveyances. For each of these potential contaminant migration pathways, COC concentrations would be reduced as the COC is transported from one portion of the Site to another area via dilution and sorption pathways. As a result, concentrations of COCs measured at an AOC will be greater than the expected concentration at the ESA.

The reduction in COC concentrations (via dilution by stormwater, sorption by soils, etc.) during this chemical migration is often significant based on the distance that a COPEC would have to travel from the AOC to the sensitive natural resource. Therefore, ESAs that are located a great distance from an AOC are not likely to be impacted by chemical migration of contaminants, unless the COCs are present at high concentrations and/or there is a large volume of material transported.

The following subsections detail the analysis of potential migration pathways from each of the South-Side AOCs and Table 9 summarizes the findings.

4.1 AOC 3A and 3B – Former Metal Chip Storage Pads

Since no COPECs were reported in AOC 3B, only potential migration pathways from AOC 3A were evaluated. During the site visit for the BEE, evidence of disturbance in AOC 3A included concrete debris piles, as well as the presence of vegetation that is typically found in disturbed areas (see photos in Appendix A). No obvious overland drainage paths were observed from the former chip pads. However, stormwater catch basins were present in the vicinity. The stormwater collection system in this portion of the site conveys water into the detention basin located in the northeaster portion of the main plant area of the facility.

Based on the above, it appears that most flow from the AOC would be channeled into the stormwater collection system. Any overland flow from the AOC would generally be of little significance and would

probably never reach any ESAs prior to infiltrating into the ground surface, evaporating, or being diluted to undetectable concentrations.

4.2 AOC 6 – Cameron Coolant Disposal Area

Since the Cameron Coolant Disposal Area has not been located on the Site, no potential migration pathway analysis was conducted.

4.3 AOC 8 – Former 1,000-Gallon gasoline UST

As discussed in Section 3.3, no compounds were identified above applicable criteria in any of the soil samples collected after the UST was removed. Therefore, since no COPECs were identified a migration pathway analysis was not conducted for this AOC.

4.4 AOC 26 – Former 2,000 Gallon Waste Oil UST

As discussed in Section 3.4, no compounds were identified above applicable criteria in any of the soil samples collected during ENSR's confirmation sampling program reported in the May 2001 Site/Remedial Investigation Report. Therefore, since no COPECs were identified at this AOC, a detailed migration pathway analysis was not conducted.

4.5 AOC 29 – Old Landfill

A migration pathway analysis was conducted at AOC 29 during ENSR's April 2002 site inspection. Based on field observations it appears that due to the steep slopes along the Old Landfill's southern and eastern borders, overland flow from the Old Landfill will be toward the southern agricultural fields, toward the Ephemeral Stream, or toward the Inverse Ponds. During the inspection, however, no obvious drainage pathways or erosion channels were identified. Although unlikely, it was concluded that due to the steep gradient and the proximity to the open waters of the Inverse Ponds and the wetlands associated with the Ephemeral Stream, it appears that a migration pathway may exist from the Old Landfill to the Inverse Pond and/or the wetlands associated with the Ephemeral Stream.

4.6 AOC 37 – Ephemeral Stream

Although arsenic was not identified as a COPEC and single result exceeding criteria was concluded to be anomalous, as a conservative measure a migration pathway analysis was conducted. Based on observations made during site visits made in conjunction with this BEE, drainage at this AOC follows the swale of the Ephemeral Stream to Lopatcong Creek located approximately 2,100 feet from the head of the Ephemeral Stream. The Lopatcong Creek flows along the southeast portion of the Site toward the southwest and discharges to the Delaware River, which is located approximately 0.5-mile southwest of the Site. During ENSR's site inspections, the Ephemeral Stream dried prior to its

confluence with Lopatcong Creek (see photo in Appendix A). Although the drainage swale was dry during ENSR's site visit, a potential migration pathway from the Ephemeral Stream to Lopatcong Creek was identified.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Initially, a total of seven AOCs were identified on the South-Side portion of the Ingersoll-Rand Facility in Phillipsburg, New Jersey. The following subsections discuss ENSR's conclusions based on COPECs identified at each AOC, identified ESAs, and potential migration pathways from the AOCs to ESAs.

5.1 Former Metal Chip Pads – AOC 3A & 3B

Based on post excavation soil analytical results, PCB-impacted soil with concentrations in excess of NJDEP Soil Cleanup Criteria at AOC 3A has been removed and disposed of off-site. Prior to removal, soil impacted with PCBs was identified at depths below two feet with greatest concentrations at approximately four feet below grade. Although a surface migration pathway is present in the form of stormwater catch basins, there does not appear to have been a pathway for impacted soil to be deposited at the surface. Further, if some migration of PCB-impacted soil did occur, it would have been channeled to the Stormwater Retention Pond in the northeast corner of the IR property, which is not defined as an ESA. Therefore, based on the removal of contamination and the lack of migration pathways to ESAs, no further ecological investigation is warranted in regards to this AOC.

As discussed earlier, sampling in AOC 3B did not confirm the presence of any COPECs in this AOC. Therefore, no additional ecological investigation is warranted.

5.2 Cameron Coolant Disposal Area – AOC 6

As discussed in previous sections, the Cameron Coolant Disposal Area was not located and has received conditional NFA determination from NJDEP. As such, no COPECs have been identified and no further ecological investigation is warranted.

5.3 Former 1,000 Gallon Gasoline UST – AOC 8

Since analytical results at this AOC did not identify any COPECs, no additional ecological investigation is warranted.

5.4 Former 2,000 Gallon Waste Oil UST – AOC 26

Since analytical results at this AOC did not identify any COPECs, no additional ecological investigation is warranted.

5.5 Old Landfill – AOC 29

Based on soil analytical results, COPECs were identified at the Old Landfill and are presented on Table 7. Additionally, the migration pathway analysis indicated that there was some potential for surface contamination to migrate to the Inverse Ponds and/or the wetlands associated with the Ephemeral Stream. However, as shown on Table 7, these compounds were often detected at depths ranging from five feet to 35 feet below ground surface. Samples collected from surface soil around the perimeter of the landfill reported only two locations where PAHs slightly exceed applicable soil cleanup criteria. Based on the depths of samples, no migration pathway exists to transport these COPECs to the nearby ESAs.

PAH concentrations in excess of soil cleanup criteria in the two surface samples around the Old Landfill were reviewed in more detail to determine potential migration pathways. Locations of these samples (AOC-29-6 and AOC-29-12) are shown on Figure 5 and analytical results are presented on Table 7. As shown on Figure 5, AOC-29-6A was collected on the southwest side of the landfill on the south-side of the fence separating the landfill from the rest of the South-Side Areas. AOC-29-12A (and its duplicate, AOC-29-12A1) is located to the west of the Inverse Ponds and north of the Old Landfill outside the boundary of the Site.

Sample AOC-29-6A borders an agricultural field with a general topographic gradient sloping gently to the south-southwest. Overland flow in this area would likely flow into the fields and infiltrate into the soil and sediment would likely settle in the crop rows. Regardless, based on the distance to any of the identified ESAs, the concentrations of PAHs identified at this location would be likely be reduced to levels significantly below ecological risk levels prior to entering an ESA.

Sample AOC-29-12A/A1 is present on an eastward sloping hill which appears to drain into the Inverse Ponds. Overland flow appears to follow the slope to the Inverse Ponds. However, based on the relatively low concentrations of PAHs at this location, any overland flow bringing surface sediment from the sample location to the Inverse Ponds would be significantly diluted prior to reaching the ESA.

Based on the above, while COPECs are reported in the landfill, migration pathways are not present due to either the depth of contamination or dilution caused over the distance needed for the COPEC to travel from its origin to the nearest ESA. As such, no further ecological investigation is warranted for the Old Landfill.

5.6 Ephemeral Stream – AOC 37

As shown on Table 8, analytical results for the samples collected from the ephemeral stream indicate the presence of arsenic in one sample at a concentration exceeding the NJDEP Soil Cleanup Criteria.

The exceedance of arsenic in sample A37-2-A (64.7 ppm) reported in the May 2001 Site/Remedial Investigation Report and the January 2002 RIR appears to be an anomaly. Arsenic concentrations at the other four sample locations were all reported at concentrations below the Soil Cleanup Criteria and a sample collected from the same location as A37-2-A (A37-2-A2) did not confirm the presence of arsenic in excess of the Soil Cleanup Criteria at that location. Additionally, arsenic concentrations reported at these locations as well at locations throughout the Site are within levels consistent with arsenic background concentrations in New Jersey.

Given the proximity of the sample location to nearby wetlands and to Lopatcong Creek, and that the concentration of arsenic at A37-2-a was in excess of Sediment Quality Criteria and wildlife Lowest Observable Adverse Effects Levels (LOAELs), the anomalous level of arsenic was further analyzed to assess potential ecological risks.

ESAs in proximity to the Ephemeral Stream and sample location A37-2-A include a strip of wetlands parallel to the Ephemeral Stream and Lopatcong Creek. Because the Ephemeral Stream is a man-made depression constructed to channel discharge from the Inverse Ponds to Lopatcong Creek, no obvious migration pathways exist for soil to be transported from the base of the ditch to the nearby wetland.

As discussed in Section 4.6, a migration pathway does exist for potential transport of COPECs to Lopatcong Creek. However, based on the results from downstream sediment sampling, it appears that either no migration of arsenic has occurred or dilution of arsenic along the pathway occurs quickly and a complete migration pathway to Lopatcong Creak is not present for this AOC.

Based on the above, additional ecological investigation does not appear to be warranted for this AOC.

5.7 Summary of Recommendations

The following summarizes ENSR's recommendations for further ecological evaluation of the AOCs found at the South-Side Area ("Site") of the Ingersoll-Rand facility in Phillipsburg, NJ:

- AOC 3A (Former Metal Chip Pad) – Based upon the removal of PCB-impacted soil and the lack of migration pathways to ESAs, no further ecological evaluation of this AOC is warranted.

- AOC 3B (Former Metal Chip Pad) – As no COPECs were identified for this AOC, no further ecological evaluation of this AOC is warranted.

- AOC 6 (Cameron Coolant Disposal Area) – Conditional NFA status was granted by NJDEP and no COPECs were identified, therefore no further ecological evaluation is warranted.

- AOC 8 (Former 1,000 Gallon Gasoline AST) – Analytical results for this AOC did not identify any COPECs, therefore no further ecological evaluation is warranted.

- AOC 26 (Former 2,000 Gallon Waste Oil UST) – Analytical results for this AOC did not identify any COPECs, therefore no further ecological evaluation is warranted.

- AOC 29 (Old Landfill) – Although COPECs were identified in the landfill, no migration pathway to ESAs exists due to either depth of material or to distance which COPECs would need to travel from their origin to the nearest ESA. As that no migration pathways exist for the identified COPECs, no further ecological evaluation is warranted for this AOC.

- AOC 37 (Ephemeral Stream) – Arsenic was identified in one sample as a COPEC for this AOC, and the drainage swale provides a potential migration pathway to an ESA. However, downstream sampling of the sample location where arsenic was found as a COPEC demonstrates that either the arsenic identified as a COPEC is not mobile or that it dilutes quickly. In either scenario, there is no complete migration pathway to an ESA for arsenic. Therefore, in the absence of a complete migration pathway for any identified COPEC, no further ecological evaluation of the AOC is warranted.

6.0 REFERENCES

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TABLES

TABLE 1
SUMMARY OF AREAS OF CONCERN
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.
Phillipsburg, New Jersey

AOC Number	AOC Name	Contaminants Identified in Excess of NJDEP Soil Cleanup Criteria	Regulatory Status
AOC 3A & 3B	Former Metal Chip Storage Pads	PCBs	NFA Approved
AOC 6	Cameron Coolant Disposal Area	unknown	Conditional NFA Approved
AOC 8	Former 500 Gallon Gasoline UST	None	NFA Approved
AOC 26	2000 Former Gallon Waste Oil UST	N/A	NFA Approved
AOC 29	Old Landfill	TPH, BNs, PCBs, Metals	Recommended No Further Action with Deed Notice
AOC 37	Ephemeral Stream	Arsenic	NFA Approved

NOTES:
AOC - Area of Concern
NJDEP - New jersey Department of Environmental Protection
PCB - Polychlorinated Biphenyls
TPH - Total Petroleum hydrocarbons
NFA - No Further Action

TABLE 2
VEGETATION OBSERVED DURING APRIL 2002 SITE INSPECTIONS
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.
Phillipsburg, New Jersey

Common Name	Latin Name	Location Observed
Japanese honeysuckle	*Lonicera japonica*	*Open fields and forested fringes*
Poison Ivy	*Toxicodendron radicans*	*Open and landscaped fields*
Common Reed	*Phragmites australis*	*Open and landscaped fields*
Box-Elder	*Acer negundo*	*Forested fringes*
Multiflora Rose	*R. Multiflora Thunb.*	*Open fields to forested fringes*
Black Cherry	*Prunus serotina*	*Successional forested areas*
Pussy Willow	*Salix discolor*	*Near ephemeral stream and typically near water*
White Oak	*Quercus alba*	*Forested upland areas*
Staghorn Sumac	*Rhus typhina*	*Forested areas, landscaped fields*
Black Locust	*Robinia pseudoacacia*	*Successional forest areas and forested fringes*
Sycamore	*Platanus occidentalis*	*Forested areas and forested fringes*
Tree-of-Heaven	*Ailanthus altissima*	Typical throughout site
Perennial Ryegrass	*Lolium perenne*	*Open fields*
Black Walnut	*Juglans nigra*	*Forested fringes*
Big Tooth Aspen	*Tremulus populoides*	*Forested fringes*
Silver Maple	*Acer saccharium*	*Forested areas*
Crabgrass	*Digitaria sp.*	*Typical throughout site*
Yellow foxtail	*Alopecurus sp.*	*Open fields*
Sweet goldenrod	*Solidago sp.*	*Open Fields*

TABLE 3
VEGETATION, WILDLIFE AND BIRDS OBSERVED DURING APRIL 2002 SITE INSPECTIONS
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.,
Phillipsburg, New Jersey

Common Name	Latin Name	Location Observed
Eastern Bluebird	*Sialia sialis*	Open landscaped fields
Canada Goose	*Branta canadensis*	Typical in landscaped areas and near open water
Dark-eyed Junco	*Junco hyemalis*	Forested areas
Mallard	*Anas platyrhynchos*	Near open water
Song Sparrow	*Melospiza melodia*	Forested fringes and open fields
Mourning Dove	*Zenaidura macroura*	Perched and open fields
American Robin	*Turdus migratorius*	Typical throughout site
Turkey Vulture	*Cathartes aura*	Soaring above property
American Crow	*Corvus brachyrhynchos*	Typical throughout site
Tufted titmouse	*Baeolophus bicolor*	Open forests and forested fringes
American Kestrel	*Falco sparverius*	Perched and soaring above property site
Red-winged blackbird	*Agelaius phoeniceus*	Open landscaped fields near Lopatcong Creek
Northern Mockingbird	*Mimus polyglottus*	Open forests and forested fringes
Blue Jay	*Cyanocitta cristata*	Forested areas
White Tailed Deer	*Odocoileus virginianus*	Not observed but expected to be present on or near site.
Woodchuck	*Marmota monax*	Near open water and open fields
Eastern Garter snake	*Thamnophis s. sirtalis*	Ephemeral Stream and open fields
E. Cottontail	*Sylvilagus floridanus*	Open agricultural and landscaped fields
Northern Flicker	*Colaptes auratus*	Open forests and agricultural fields
Cardinal	*Richmondena cardinalis*	Open forested areas
Eastern Phoebe	*Sayornis phoebe*	Open agricultural fields
European Starling	*Sturnus vulgaris*	Typical throughout site
Downy woodpecker	*Picoides pubescens*	Forested areas
Ring-billed Gull	*Larus delawarensis*	Soaring above property
Red-tailed hawk	*Buteo jamaicensis*	Soaring above property
Killdeer	*Charadrius vociferus*	Open agricultural fields
Sharp Shinned Hawk	*Accipiter striatus velox*	Soaring above property

TABLE 4
SUMMARY OF SOUTH-SIDE ENVIRONEMENTALLY SENSITIVE AREAS
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.
Phillipsburg, New Jersey

Environmentally Sensitive Area (per NJAC 7:1E-1.8)	Presence at Site or Immediately Adjacent to Site (Comments)
1. Surface Waters	Lopatcong Creek is located along southeast portion of site; Lopatcong Creek flows southwesterly for approximately 2 miles before entering the Delaware River. Ephemeral Stream located within central portion of South-Side Area but is not considered a surface water body.
2. Sources of water supply	Not present No public water wells or water supply reservoirs are located on or immediately adjacent to the site.
3. Bay islands and barrier island corridors	Not present
4. Beaches	Not present
5. Dunes	Not present
6. Wetlands and wetland transition areas	A wetland presence absence study on the property indicated that many of the state and federally listed wetlands were not present. Only one wetland area was confirmed parallel to the Ephemeral Stream.
7. Breeding areas for forest area nesting species, colonial water birds, or aquatic furbearers	Not present
8. Migratory stopover areas for migrant shorebirds, raptors, or passerines	Not present
9. Wintering areas (including coastal tidal marshes and water areas), waterfowl concentration areas, and Atlantic white cedar stands	Not present
10. Prime fishing areas	Not present
11. Finfish migratory pathways	Not present
12. Estuarine areas	Not present
13. Shellfish harvesting waters	Not present
14. Forest areas (prime and unique forestland)	Not present
15. Federal and State-listed rare species	Not Present USFWS indicated that except for an occasional transient bald eagle (Haliaeetus leucocephalus), no other federally listed or proposed threatened or endangered flora or fauna are known to occur at the site. NJ Natural Heritage Program (NJNHP) did not have any records for rare species or natural communities in the vicinity of the site.
16. Federal and State-listed wilderness areas	Not present
17. Federal and State Wild and Scenic Rivers	Not present Delaware River is located approximately 0.5 miles southwest of the site.

TABLE 5
SUMMARY OF SOIL ANALYTICAL RESULTS:
AOC 3A (Former Metal chip Storage Pad)
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.
Phillipsburg, New Jersey

Field ID	Lab ID	Sample Date	Sample Time	Matrix	Depth	*Total PCBs*	Thallium via ICP	Thallium via AA
			NJDEP Most Stringent Soil Cleanup Criteria (MSSCC)			***0.49***	***2.0***	***2.0***
			NJDEP Sediment Quality Criteria Lowest Effect Limit (LEL)			---	---	---
			Wildlife Lowest Observed Adverse Effects Level (NOAEL)			***1.13*** [(1)]	***0.278*** [(2)]	***0.278*** [(2)]
A3A-1-A	93753001	9/22/1999	8:20	Soil	1.5-2.0 ft	ND	***2.16***	0.47*
A3A-1-A1	93753002	9/22/1999	8:25	Soil	1.5-2.0 ft	ND	***2.68***	0.47*
A3A-3-A	93741008	9/21/1999	14:00	Soil	2.0-2.5 ft	ND	1.44	NA
A3A-5-A	93741007	9/21/1999	13:35	Soil	2.0-2.5 ft	ND	1.43	NA
A3A-7-A	93753003	9/22/1999	8:40	Soil	1.5-2.0 ft	ND	***2.22***	0.39
A3A-9-A	93753004	9/22/1999	8:55	Soil	1.5-2.0 ft	ND	1.88	NA
A3A-11-A	93753006	9/22/1999	9:40	Soil	2.5-3.0 ft	ND	***2.23***	0.39*
A3A-13-A	93753005	9/22/1999	9:20	Soil	0.5-1.0 ft	ND	***3.0***	0.53*
A3A-15-A	93753009	9/22/1999	11:00	Soil	2.0-2.5 ft	**0.671**	***2.02***	0.36*
A3A-17-A	93753008	9/22/1999	10:35	Soil	3.5-4.0 ft	ND	***2.68***	0.47*
A3A-19-A	93753007	9/22/1999	10:15	Soil	2.5-3.0 ft	ND	***2.48***	0.44*
A3A-23-A	93753011	9/22/1999	13:50	Soil	3.5-4.0 ft	ND	***2.25***	0.40*
A3A-25-A	93753010	9/22/1999	13:35	Soil	2.0-2.5 ft	ND	***2.98***	0.62
A3A-27-A	93753012	9/22/1999	14:05	Soil	2.5-3.0 ft	ND	***3.37***	0.55
A3A-15-B	258054	2/15/2001	13:05	Soil	4-4.5 ft	ND	NA	NA
A3A-15-B1	258056	2/15/2001	13:20	Soil	4-4.5 ft	ND	NA	NA
A3A-15-C	258055	2/15/2001	13:10	Soil	5.5-6 ft	ND	NA	NA
A3A-25-A1	37435	2/12/2001	11:25	Soil	2-2.5 ft	NA	NA	0.62
A3A-27-A1	37433	2/12/2001	10:45	Soil	2.5-3 ft	NA	NA	0.55
A3A-27-A2	37434	2/12/2001	10:50	Soil	2.5-3 ft	NA	NA	(0.41) U
A3B-7-A1	37431	2/12/2001	9:35	Soil	2.5-3 ft	NA	NA	NA
A3A-15-B	306357	10/11/2001	11:10	Soil	4-4.5 ft	**4.9**	NA	NA
A3A-15-B1	306359	10/11/2001	11:20	Soil	4-4.5 ft	**11.2**	NA	NA
A3A-15-B2	306886	10/12/2001	11:40	Soil	3.5-4 ft	**0.66**	NA	NA
A3A-15-B3	306887	10/12/2001	11:45	Soil	3.5-4 ft	**6.5**	NA	NA
A3A-15-B4	306888	10/12/2001	11:50	Soil	3.5-4 ft	0.12	NA	NA
A3A-15-B5	306889	10/12/2001	11:55	Soil	3.5-4 ft	**1.2**	NA	NA
A3A-15-C2	N6962-01	12/3/2001	11:50	Soil	6-6.5 ft	0.024	NA	NA
A3A-15-C3	N6962-02	12/3/2001	11:20	Soil	5.5-6 ft	ND	NA	NA
A3A-15-C4	N6962-03	12/3/2001	12:20	Soil	5.5-6 ft	**6.5**	NA	NA
A3A-15-C5	N6962-04	12/3/2001	11:55	Soil	5.5-6 ft	0.038	NA	NA
A3A-15-C6	N6962-05	12/3/2001	12:00	Soil	5.5-6 ft	0.048	NA	NA
A3A-15-C7	N6962-06	12/3/2001	12:15	Soil	5.5-6 ft	ND	NA	NA
A3A-15-C8	N7091-01	12/12/2001	11:20	Soil	5.5-6 ft	ND	NA	NA
A3A-15-C9	N7091-02	12/12/2001	13:35	Soil	5.5-6 ft	ND	NA	NA
A3A-15-C10	N7153-02	12/18/2001	10:40	Soil	5.5-6 ft	ND	NA	NA
A3A-15-C11	N7153-03	12/18/2001	10:50	Soil	5.5-6 ft	ND	NA	NA

NOTES:

All results reported in parts per million (ppm)

PCB - Polychlorinated Biphenyls

ICP - Inductively Coupled Plasma Spectroscopy

AA - Atomoic Adsorbtion Spectorscopy

NA - Not Analyzed

ND - Not Detected

BOLD concentration exceeds MSSCC.

[(1)] Test species = Oldfield Mouse / Endpoint species = Cottontail Rabbit

[(2)] Test species = Rat / Endpoint species = Cottontail Rabbit

* - Calculated value based on select re-sampling of thallium exceedences via ICP. See ENSR's May 2000 Site/Remedial Investigation Report for discussion of calculation.

TABLE 6
SUMMARY OF SOIL ANALYTICAL RESULTS:
AOC 3B (Former Metal Chip Storage Pad)
South-Side Area Baseline Ecological Evaluation
Ingersoll Rand Co.
Phillipsburg, New Jersey

Field ID	Lab ID	Sample Da	Sample Ti	Matrix	Depth	Thallium via ICP	Thallium via AA
		NJDEP Most Stringent Soil Cleanup Criteria (MSSCC)				2	2
		NJDEP Sediment Quality Criteria Lowest Effect Limit (LEL)				-	-
		Wildlife Lowest Observed Adverse Effects Level (NOAEL)				0.278 (1)	0.278 (1)
A3B-1-A	93741001	9/21/1999	8:45	Soil	5.0-5.5	1.56	NA
A3B-3-A	93741002	9/21/1999	9:15	Soil	2.0-2.5	0.981 B	NA
A3B-5-A	93741003	9/21/1999	9:45	Soil	2.0-2.5	1.71	NA
A3B-7-A	93741004	9/21/1999	10:20	Soil	2.5-3.0	**2.34**	NA
A3B-7-A1	37431	2/12/2001	9:35	Soil	2.5-3 ft	NA	(0.44) U
A3B-9-A	93741005	9/21/1999	10:50	Soil	2.0-2.5	1.04 B	NA
A3B-11-A	93741006	9/21/1999	11:15	Soil	2.0-2.5	(0.305) U	NA

NOTES:
All results reported in parts per million (ppm)
PCB - Polychlorinated Biphenyls
ICP - Inductively Coupled Plasma Spectroscopy
AA - Atomoic Adsorbtion Spectorscopy
NA - Not Analyzed
ND - Not Detected
BOLD concentration exceeds MSSCC.
(1) Test species = Rat / Endpoint species = Cottontail Rabbit

TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				**A29-1-A**	**A29-1-B**	**A29-1-C**	**A29-1-D**	**A29-1-E**	**A29-2-A**
Lab ID				37656	37657	37658	37659	37660	257518
Sample Date				2/13/2001	2/13/2001	2/13/2001	2/13/2001	2/13/2001	2/14/2001
Sample Time				11:40	11:55	12:25	13:10	14:00	12:40
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				6-6.5 ft	16-16.5 ft	23-23.5 ft	35-35.5 ft	41-41.5 ft	6.5-7 ft
PARAMETERS	**LOAEL**	**NJDEP LEL**	**NJDEP MSSCC**						
Total Petroleum Hydrocarbons	---	---	10,000	2320	345	26.1	239	(25) U	**18600**
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)									
1,2-BENZPHENANTHRACENE	---	---	9	(1.8) U	3.5	0.035 J	2.8	0.018 J	**9.1**
Acenaphthene	---	---	100	0.086 J	0.09 J	0.03 J	0.19 J	(0.4) U	(27) U
ACENAPHTHYLENE	---	---	---	(1.8) U	0.024 J	(0.34) U	0.016 J	(0.4) U	(27) U
ANTHRACENE	---	0.220	100	0.17 J	0.18 J	0.008 J	0.21 J	(0.4) U	(27) U
Benzo(a)anthracene	---	0.32	0.9	**2**	**2.3**	0.039	**1.8**	0.025 J	**4.5**
Benzo(a)pyrene	20.13 (1)	0.37	0.66	**3.8**	**4.6**	0.044	**3.4**	0.016 J	**5.6**
Benzo(k)fluoranthene	---	0.24	0.9	**2**	**2.4**	0.023 J	**2.1**	0.012 J	**4.4**
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	**5.9**	**8.2**	0.065	**5.7**	0.03 J	**12**
Benzo[g,h,I]perylene	---	---	---	4.6	5	0.052 J	3	0.018 J	7.8
Dibenz(a,h)anthracene	---	---	0.66	**0.97**	**1.2**	0.01 J	**0.78**	(0.04) U	**1.8 J**
FLUORANTHENE	---	0.75	100	2	2.5	0.076 J	2.4	0.028 J	5.9
FLUORENE	---	0.19	100	0.097 J	0.11 J	0.026 J	0.22 J	(0.4) U	1 J
Indeno[1,2,3-cd]pyrene	---	---	0.9	**4.4**	**5.1**	0.045	**3.2**	0.016 J	**7**
NAPHTHALENE	---	---	100	0.29 J	0.26 J	0.17 J	0.6	(0.4) U	(27) U
PHENANTHRENE	---	---	---	0.91 J	1.2	0.088 J	1.6	0.025 J	4
PYRENE	---	0.49	100	2.1	2.7	0.059 J	2.3	0.026 J	6.5
POLYCHLORINATED BIPHENYLS (PCBs)									
TOTAL PCBs	---	0.07	**0.49**	0.17	0.26	ND	0.23	ND	**3.7**
PRIORITY POLLUTANT METALS (PPMetals)									
ANTIMONY	---	---	14	(0.86) U	1.9	(0.74) U	(0.76) U	(0.93) U	3.4
ARSENIC	2.537 (1)	6	20	1.4	1.5	(0.64) U	(0.66) U	8.9	16.5
BERYLLIUM	---	---	2	0.03	0.09	(0.019) U	0.04	1.2	0.26
CADMIUM	35.892 (2)	0.6	39	0.74	(0.086) U	(0.075) U	0.14	(0.095) U	5.6
Chromium	48.89 (2)	26	20*	**65.3**	**56.4**	2.3	**133**	**24.6**	**145**
COPPER	51.1 (3)	16	600	122	**1840**	9	120	19.2	**4130**
LEAD	297.68 (2)	31	400	70.8	205	8.2	52.2	15.4	**422**
MERCURY	---	0.2	14	0.45 B	0.03	(0.017) U	0.09	0.04	13.4
NICKEL	297.68 (2)	16	250	75.6	96.6	3.1	239	17.8	188
SELENIUM	1.228 (2)	---	63	(4.3) U	(8.4) U	(1.1) U	(1.1) U	(0.93) U	(5.7) U
SILVER	---	---	110	0.65	0.34	0.25	0.58	(0.17) U	8.5
THALLIUM	0.278 (2)	---	2	(0.97) U	(0.95) U	(0.83) U	(0.86) U	(1) U	(1.3) U
ZINC	1190.7 (2)	120	1500	46.2	**3910**	168	30.6	49.3	**2240 J**

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
(1) Test species = Mouse / Endpoint species = Cottontail Rabbit
(2) Test species = Rat / Endpoint species = Cottontail Rabbit
(3) Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

U - Indicates that the analyte was not detected at the detection limit shown in parentheses.
J - Indicates that the analyte was detected below its detection limit and is estimated.
NA - Not Analyzed
ND - Not Detected

TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				A29-2-B	A29-2-C	A29-2-D	A29-3-A	A29-3-B	A29-3-C
Lab ID				257519	257520	257521	257512	257514	257515
Sample Date				2/14/2001	2/14/2001	2/14/2001	2/14/2001	2/14/2001	2/14/2001
Sample Time				13:00	13:40	14:15	9:20	9:40	10:15
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				16-16.5 ft	26-26.5 ft	34-34.5 ft	5-5.5 ft	16-16.5 ft	25-25.5 ft
PARAMETERS	**LOAEL mg/kg [a]**	**NJDEP LEL**	**NJDEP MSSCC**						
Total Petroleum Hydrocarbons	---	---	10,000	2090	442	(25) U	26000	3460	(25) U
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)									
1,2-BENZPHENANTHRACENE	---	---	9	**31**	7.3	(0.4) U	1.8 J	0.79 J	(0.42) U
Acenaphthene	---	---	100	(3.6) U	0.037 J	(0.4) U	(20) U	0.061 J	(0.42) U
ACENAPHTHYLENE	---	---	---	(3.6) U	(0.75) U	(0.4) U	(20) U	(1.9) U	(0.42) U
ANTHRACENE	---	0.220	100	0.46 J	0.17 J	(0.4) U	(20) U	0.066 J	(0.42) U
Benzo(a)anthracene	---	0.32	0.9	**23**	**4.2**	(0.04) U	**1.6 J**	0.49	(0.042) U
Benzo(a)pyrene	20.13 [1]	0.37	0.66	**32**	**5**	(0.04) U	**3.5**	**0.84**	(0.042) U
Benzo(k)fluoranthene	---	0.24	0.9	**16**	**3.8**	(0.04) U	**2.1**	0.62	(0.042) U
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	**48**	**12**	(0.04) U	**5.6**	**1.6**	(0.042) U
Benzo[g,h,I]perylene	---	---	---	23	5.7	(0.4) U	0.031 J	1.2 J	(0.42) U
Dibenz(a,h)anthracene	---	---	0.66	**6.8**	**1.7**	(0.04) U	**0.66 J**	0.32	(0.042) U
FLUORANTHENE	---	0.75	100	19 J	4.9	(0.4) U	1.8 J	0.62 J	(0.42) U
FLUORENE	---	0.19	100	0.08 J	0.036 J	(0.4) U	(20) U	0.042 J	(0.42) U
Indeno[1,2,3-cd]pyrene	---	---	0.9	**24**	**5.4**	(0.04) U	**4.3**	**1.2**	(0.042) U
NAPHTHALENE	---	---	100	0.12 J	0.25 J	(0.4) U	(20) U	0.3 J	(0.42) U
PHENANTHRENE	---	---	---	2.8 J	1.6	(0.4) U	1.1 J	0.42 J	(0.42) U
PYRENE	---	0.49	100	18 J	4	(0.4) U	1.7 J	0.48 J	(0.42) U
POLYCHLORINATED BIPHENYLS (PCBs)									
TOTAL PCBs	---	0.07	0.49	0.17	ND	ND	**1.98**	0.38	ND
PRIORITY POLLUTANT METALS (PPMetals)									
ANTIMONY	---	---	14	(0.76) U	(0.88) U	(0.94) U	(4.2) U	(0.82) U	12.9
ARSENIC	2.537 [1]	6	20	2.4	(0.77) U	10.8	8.8	6.9	13.2
BERYLLIUM	---	---	2	0.03	0.08	1.5	0.6	0.44	0.43
CADMIUM	35.892 [2]	0.6	39	0.25	(0.09) U	(0.097) U	11.5	1	6.6
Chromium	48.89 [2]	26	20*	**155**	**25.6**	17.6	**505**	**89.5**	**98.3**
COPPER	51.1 [3]	16	600	151	88.4	24.3	473	140	**5640**
LEAD	297.68 [2]	31	400	26.3	13.3	15.3	**563**	199	251
MERCURY	---	0.2	14	0.13	0.05	0.07	(0.02) U	0.38	(0.021) U
NICKEL	297.68 [2]	16	250	154	26.3	25.8	**633**	82.2	**250**
SELENIUM	1.228 [2]	---	63	(0.76) U	(0.88) U	(0.94) U	(4.2) U	(0.82) U	(5) U
SILVER	---	---	110	0.38	(0.16) U	(0.17) U	31.3	2.1	42.9
THALLIUM	0.278 [2]	---	2	(0.86) U	(0.99) U	(1.1) U	(4.7) U	(0.92) U	(1.1) U
ZINC	1190.7 [2]	120	1500	46.3	41.6	58.5	170	71.4	205

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
[1] Test species = Mouse / Endpoint species = Cottontail Rabbit
[2] Test species = Rat / Endpoint species = Cottontail Rabbit
[3] Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

U - Indicates that the analyte was not detected at the detection limit shown in parentheses.
J - Indicates that the analyte was detected below its detection limit and is estimated.
NA - Not Analyzed
ND - Not Detected

TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				**A29-3-D**	**A29-3-E**	**A29-4-A**	**A29-4-A1**	**A29-4-B**	**A29-4-C**
Lab ID				257516	257517	37652	37655	37653	37654
Sample Date				2/14/2001	2/14/2001	2/13/2001	2/13/2001	2/13/2001	2/13/2001
Sample Time				10:30	11:00	9:20	9:30	9:45	10:05
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				29-39.5 ft	34-34.5 ft	6-6.5 ft	6-6.5 ft	16-16.5 ft	22-22.5 ft
PARAMETERS	**LOAEL mg/kg [a]**	**NJDEP LEL**	**NJDEP MSSCC**						
Total Petroleum Hydrocarbons	---	---	10,000	2870	70.8	453	410	260	(25) U
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)									
1,2-BENZPHENANTHRACENE	---	---	9	(2) U	(0.39) U	8.8	**11**	**28**	0.021 J
Acenaphthene	---	---	100	(2) U	(0.39) U	0.021 J	0.016 J	0.058 J	(0.41) U
ACENAPHTHYLENE	---	---	---	(2) U	(0.39) U	0.026 J	(0.75) U	(1.8) U	(0.41) U
ANTHRACENE	---	0.220	100	(2) U	(0.39) U	0.14 J	0.14 J	1.4 J	(0.41) U
Benzo(a)anthracene	---	0.32	0.9	(0.2) U	(0.039) U	5.6	7.2	21	0.028 J
Benzo(a)pyrene	20.13 [1]	0.37	0.66	(0.2) U	(0.039) U	**6.7**	**8.4**	**22**	0.017 J
Benzo(k)fluoranthene	---	0.24	0.9	(0.2) U	(0.039) U	**4.7**	**6.2**	**14**	0.012 J
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	(0.2) U	(0.039) U	**14**	**17**	**36**	0.036 J
Benzo[g,h,I]perylene	---	---	---	0.05 J	0.012 J	5.6	6.7	15	0.017 J
Dibenz(a,h)anthracene	---	---	0.66	(0.2) U	(0.039) U	**2**	**2.6**	**5.4**	(0.041) U
FLUORANTHENE	---	0.75	100	0.24 J	(0.39) U	5.2	6	23	0.017 J
FLUORENE	---	0.19	100	0.17 J	(0.39) U	0.02 J	0.017 J	(1.8) U	(0.41) U
Indeno[1,2,3-cd]pyrene	---	---	0.9	(0.2) U	0.0079 J	**6.3**	**7.9**	**17**	0.015 J
NAPHTHALENE	---	---	100	(2) U	(0.39) U	0.067 J	0.065 J	0.13 J	(0.41) U
PHENANTHRENE	---	---	---	(2) U	(0.39) U	1.1	1.1	8.9	(0.41) U
PYRENE	---	0.49	100	0.19 J	(0.39) U	5.1	6.2	22	0.016 J
POLYCHLORINATED BIPHENYLS (PCBs)									
TOTAL PCBs	---	0.07	0.49	ND	ND	ND	ND	ND	ND
PRIORITY POLLUTANT METALS (PPMetals)									
ANTIMONY	---	---	14	(0.94) U	(0.91) U	**21.2**	**224**	4.6	(1.5) U
ARSENIC	2.537 [1]	6	20	10.4	10.2	13.5	14.3	12.1	17.9
BERYLLIUM	---	---	2	**2.2**	**3.4**	(0.1) U	(0.11) U	0.16	1.2
CADMIUM	35.892 [2]	0.6	39	(0.097) U	0.28	**45.4**	31.3	3.4	7
Chromium	48.89 [2]	26	20*	15	8.7	**161 B**	**102**	**51.7**	**46.2**
COPPER	51.1 [3]	16	600	31.5	24.2	278	262	71.8	61.5
LEAD	297.68 [2]	31	400	16.7	15.2	**556 B**	**1900**	120	21.9
MERCURY	---	0.2	14	0.07	(0.019) U	0.71	0.63	0.32	0.09
NICKEL	297.68 [2]	16	250	24	27.7	**424**	**311**	49.8	70.7
SELENIUM	1.228 [2]	---	63	(0.94) U	(0.91) U	(4) U	(4.4) U	(1.3) U	(1.5) U
SILVER	---	---	110	(0.17) U	(0.16) U	(0.71) U	(0.79) U	(0.23) U	(0.26) U
THALLIUM	0.278 [2]	---	2	(1.1) U	(1) U	**(4.5) U**	**(5) U**	(1.4) U	(1.6) U
ZINC	1190.7 [2]	120	1500	62.3	43.1	257	193	88.9	320

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
[1] Test species = Mouse / Endpoint species = Cottontail Rabbit
[2] Test species = Rat / Endpoint species = Cottontail Rabbit
[3] Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
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Protection Most Stringent Soil Cleanup Criteria.

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ND - Not Detected

TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				**A29-5-A**	**A29-5-B**	**A29-5-C**	**A29-10-A**	**A29-11-A**	**A29-12-A**
Lab ID				258050	258052	258053	278366	278367	278368
Sample Date				2/15/2001	2/15/2001	2/15/2001	5/31/2001	5/31/2001	5/31/2001
Sample Time				9:40	10:10	12:00	13:35	14:25	14:45
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				6-6.5 ft	16-16.5 ft	29-29.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
PARAMETERS	**LOAEL mg/kg [a]**	**NJDEP LEL**	**NJDEP MSSCC**						
Total Petroleum Hydrocarbons	---	---	10,000	(25) U	(25) U	(25) U	(25) U	629	56.9
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)									
1,2-BENZPHENANTHRACENE	---	---	9	0.15 J	(0.4) U	(0.43) U	0.03 J	0.23 J	1.6
Acenaphthene	---	---	100	(0.4) U	(0.4) U	(0.43) U	(0.41) U	0.01 J	0.01 J
ACENAPHTHYLENE	---	---	---	0.065 J	(0.4) U	(0.43) U	(0.41) U	0.02 J	0.02 J
ANTHRACENE	---	0.220	100	0.04 J	(0.4) U	(0.43) U	(0.41) U	0.02 J	0.04 J
Benzo(a)anthracene	---	0.32	0.9	0.086	(0.04) U	(0.043) U	0.02 J	0.14	0.84
Benzo(a)pyrene	20.13 [1]	0.37	0.66	0.095	(0.04) U	(0.043) U	0.04 J	0.22	**1.2**
Benzo(k)fluoranthene	---	0.24	0.9	0.073	(0.04) U	(0.043) U	0.02 J	0.17	0.87
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	0.18	(0.04) U	(0.043) U	0.05	0.44	**3.2**
Benzo[g,h,I]perylene	---	---	---	0.074 J	(0.4) U	(0.43) U	0.03 J	0.11 J	1.5
Dibenz(a,h)anthracene	---	---	0.66	0.016 J	(0.04) U	(0.043) U	(0.041) U	0.03 J	0.43
FLUORANTHENE	---	0.75	100	0.21 J	(0.4) U	(0.43) U	0.05 J	0.18 J	0.96
FLUORENE	---	0.19	100	0.0089 J	(0.4) U	(0.43) U	(0.41) U	(0.38) U	(0.37) U
Indeno[1,2,3-cd]pyrene	---	---	0.9	0.068	(0.04) U	(0.043) U	0.03 J	0.11	**1.6**
NAPHTHALENE	---	---	100	0.03 J	(0.4) U	(0.43) U	(0.41) U	0.01 J	0.03 J
PHENANTHRENE	---	---	---	0.085 J	(0.4) U	(0.43) U	0.03 J	0.08 J	0.23 J
PYRENE	---	0.49	100	0.16 J	(0.4) U	(0.43) U	0.04 J	0.17 J	0.88
POLYCHLORINATED BIPHENYLS (PCBs)									
TOTAL PCBs	---	0.07	0.49	ND	ND	ND	NA	NA	NA
PRIORITY POLLUTANT METALS (PPMetals)									
ANTIMONY	---	---	14	(1.1) U	(1.1) U	(1.2) U	(1.1) U	(1) U	1.1 B
ARSENIC	2.537 [1]	6	20	**22.1**	15.2	6.8	9	18.1	7.2
BERYLLIUM	---	---	2	**2.2**	1.6	**3.1**	1.4	0.99	0.29 B
CADMIUM	35.892 [2]	0.6	39	(0.097) U	(0.095) U	(0.1) U	(0.099) U	0.71 B	0.64 B
Chromium	48.89 [2]	26	20*	18.1	18.1	9.5	14.3	19.7	**92.2**
COPPER	51.1 [3]	16	600	37.9	26.7	28.4	15.6	63.9	484
LEAD	297.68 [2]	31	400	27.8	14.3	11.8	20	43.3	61.1
MERCURY	---	0.2	14	0.07	0.06	0.02 J	0.04 B	0.08	0.08
NICKEL	297.68 [2]	16	250	46.1	24.7	47.6	14.4	20.6	118
SELENIUM	1.228 [2]	---	63	(1.1) U	(1.1) U	(1.2) U	(1.1) U	(1) U	(1) U
SILVER	---	---	110	(0.27) U	(0.26) U	(0.28) U	(0.27) U	0.43 B	0.98 B
THALLIUM	0.278 [2]	---	2	(1) U	1	(1.1) U	(1) U	(1.4) U	(0.91) U
ZINC	1190.7 [2]	120	1500	195	76.4	34.9	63.4	255	97.9

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
[1] Test species = Mouse / Endpoint species = Cottontail Rabbit
[2] Test species = Rat / Endpoint species = Cottontail Rabbit
[3] Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

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J - Indicates that the analyte was detected below its detection limit and is estimated.
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TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				**A29-12-**	**A29-6-A**	**A29-7-A**	**A29-8-A**	**A29-9-A**	**A29-13-A**
Lab ID				278369	278362	278363	278364	278365	306360
Sample Date				5/31/2001	5/31/2001	5/31/2001	5/31/2001	5/31/2001	########
Sample Time				14:50	10:50	11:25	11:45	12:05	12:30
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
PARAMETERS	**LOAEL mg/kg [a]**	**NJDEP LEL**	**NJDEP MSSCC**						
Total Petroleum Hydrocarbons	---	---	10,000	68.9	37.3	26.7	36.2	30.6	
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)									
1,2-BENZPHENANTHRACENE	---	---	9	1.7	0.59	0.37 J	0.36 J	0.19 J	0.26 J
Acenaphthene	---	---	100	0.04 J	0.02 J	0.01 J	0.03 J	(0.43) U	0.01 J
ACENAPHTHYLENE	---	---	---	0.02 J	0.03 J	0.01 J	0.01 J	(0.43) U	(0.36) U
ANTHRACENE	---	0.220	100	0.04 J	0.05 J	0.02 J	0.05 J	0.02 J	0.04 J
Benzo(a)anthracene	---	0.32	0.9	0.93	0.41	0.22	0.26	0.13	0.17
Benzo(a)pyrene	20.13 [1]	0.37	0.66	**1.4**	**0.92**	0.54	0.38	0.17	0.18
Benzo(k)fluoranthene	---	0.24	0.9	**1.1**	0.51	0.27	0.2	0.09	0.12
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	**3.4**	**1.2**	0.68	0.54	0.27	0.39
Benzo[g,h,I]perylene	---	---	---	1.5	0.53	0.52	0.33 J	0.17 J	0.22 J
Dibenz(a,h)anthracene	---	---	0.66	0.41	0.13	0.1	0.08	0.04 J	0.05
FLUORANTHENE	---	0.75	100	1	0.51	0.24 J	0.38 J	0.19 J	0.3 J
FLUORENE	---	0.19	100	(0.37) U	0.02 J	(0.38) U	0.02 J	(0.43) U	(0.36) U
Indeno[1,2,3-cd]pyrene	---	---	0.9	**1.7**	0.52	0.5	0.33	0.18	0.2
NAPHTHALENE	---	---	100	0.03 J	0.09 J	0.06 J	0.04 J	0.03 J	0.01 J
PHENANTHRENE	---	---	---	0.3 J	0.26 J	0.14 J	0.26 J	0.12 J	0.18 J
PYRENE	---	0.49	100	0.96	0.53	0.26 J	0.38 J	0.2 J	0.25 J
POLYCHLORINATED BIPHENYLS (PCBs)									
TOTAL PCBs	---	0.07	0.49	NA	NA	NA	NA	NA	NA
PRIORITY POLLUTANT METALS (PPMetals)									
ANTIMONY	---	---	14	(0.9) U	(1.2) U	(0.95) U	(1.1) U	(1) U	NA
ARSENIC	2.537 [1]	6	20	8.4	11.2	9.5	11.6	10.6	NA
BERYLLIUM	---	---	2	0.37 B	1.6	1.1	1.1	1.4	NA
CADMIUM	35.892 [2]	0.6	39	0.74 B	0.28 B	0.29 B	0.27 B	0.26 B	NA
Chromium	48.89 [2]	26	20*	40.3	15.4	20.5	23.4	20.7	NA
COPPER	51.1 [3]	16	600	496	71	98.6	62.3	31.5	NA
LEAD	297.68 [2]	31	400	53.3	46.6	42.8	49.5	41.6	NA
MERCURY	---	0.2	14	0.09	0.09	0.05	0.21	0.06	NA
NICKEL	297.68 [2]	16	250	59.7	21.5	26.4	25.4	20.1	NA
SELENIUM	1.228 [2]	---	63	(0.9) U	(1.2) U	(0.95) U	(1.1) U	(1) U	NA
SILVER	---	---	110	1.6 B	(0.29) U	0.44 B	0.27 B	(0.26) U	NA
THALLIUM	0.278 [2]	---	2	(1.2) U	(1.1) U	(0.86) U	(0.96) U	(0.95) U	NA
ZINC	1190.7 [2]	120	1500	99.6	94.4	65.9	87.1	96.5	NA

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
[1] Test species = Mouse / Endpoint species = Cottontail Rabbit
[2] Test species = Rat / Endpoint species = Cottontail Rabbit
[3] Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

U - Indicates that the analyte was not detected at the detection limit shown in parentheses.
J - Indicates that the analyte was detected below its detection limit and is estimated.
NA - Not Analyzed
ND - Not Detected

TABLE 7
SUMMARY OF ANALYTICAL RESULTS: AOC 29 (Old Landfill)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Company
Phillipsburg, New Jersey

Field ID				A29-13-	A29-14-A
Lab ID				306361	306362
Sample Date				########	########
Sample Time				12:40	13:20
Matrix				Soil	Soil
Depth				0-0.5 ft	0-0.5 ft
PARAMETERS	**LOAEL mg/kg [a]**	**NJDEP LEL**	**NJDEP MSSCC**		
Total Petroleum Hydrocarbons	---	---	10,000		
BASE NEUTRAL ORGANIC COMPOUNDS (BNs)					
1,2-BENZPHENANTHRACENE	---	---	9	0.33 J	0.47
Acenaphthene	---	---	100	0.01 J	0.02 J
ACENAPHTHYLENE	---	---	---	0.01 J	0.04 J
ANTHRACENE	---	0.220	100	0.03 J	0.05 J
Benzo(a)anthracene	---	0.32	0.9	0.19	0.32
Benzo(a)pyrene	20.13 [1]	0.37	0.66	0.21	0.5
Benzo(k)fluoranthene	---	0.24	0.9	0.16	0.29
Benzo[b]fluoranthene (3,4-Benzofluor	---	---	0.9	0.51	0.77
Benzo[g,h,I]perylene	---	---	---	0.32 J	0.36 J
Dibenz(a,h)anthracene	---	---	0.66	0.08	0.08
FLUORANTHENE	---	0.75	100	0.31 J	0.56
FLUORENE	---	0.19	100	(0.37) U	0.02 J
Indeno[1,2,3-cd]pyrene	---	---	0.9	0.28	0.39
NAPHTHALENE	---	---	100	0.02 J	0.05 J
PHENANTHRENE	---	---	---	0.15 J	0.26 J
PYRENE	---	0.49	100	0.24 J	0.48
POLYCHLORINATED BIPHENYLS (PCBs)					
TOTAL PCBs	---	0.07	0.49	NA	NA
PRIORITY POLLUTANT METALS (PPMetals)					
ANTIMONY	---	---	14	NA	NA
ARSENIC	2.537 [1]	6	20	NA	NA
BERYLLIUM	---	---	2	NA	NA
CADMIUM	35.892 [2]	0.6	39	NA	NA
Chromium	48.89 [2]	26	20*	NA	NA
COPPER	51.1 [3]	16	600	NA	NA
LEAD	297.68 [2]	31	400	NA	NA
MERCURY	---	0.2	14	NA	NA
NICKEL	297.68 [2]	16	250	NA	NA
SELENIUM	1.228 [2]	---	63	NA	NA
SILVER	---	---	110	NA	NA
THALLIUM	0.278 [2]	---	2	NA	NA
ZINC	1190.7 [2]	120	1500	NA	NA

NOTES:

All results are reported in milligrams per kilogram (mg/kg)
All depths are reported in feet below ground surface
LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks
[1] Test species = Mouse / Endpoint species = Cottontail Rabbit
[2] Test species = Rat / Endpoint species = Cottontail Rabbit
[3] Test species = 1 day old chicks / Endpoint species = American robin
NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.
NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

U - Indicates that the analyte
limit shown in parenthes
J - Indicates that the analyte
limit and is estimated.
NA - Not Analyzed
ND - Not Detected

TABLE 8
SUMMARY OF SOIL ANALYTICAL RESULTS: AOC 37 (Ephemeral Stream)
South-Side Area Baseline Ecological Investigation
Ingersoll Rand Co.
Phillipsburg, New Jersey

Field ID				A37-1-A	A37-2-A	A37-2-A1	A37-2-A2	A37-3-A	A37-4-A
Lab ID				258048	258045	258046	278371	278372	278373
Sample Date				2/16/2001	2/16/2001	2/16/2001	5/31/2001	5/31/2001	5/31/2001
Sample Time				9:00	9:05	10:15	13:05	12:40	12:55
Matrix				Soil	Soil	Soil	Soil	Soil	Soil
Depth				0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft	0-0.5 ft
PRIORITY POLLUTANT METALS (PPMetals)	**LOAEL**	**NJDEP LEL**	**NJDEP MSSCC**						
Arsenic	2.537 [1]	6	20	8	**64.7**	12.9	16.5	8.8	10.3

NOTES:

All results are reported in milligrams per kilogram (mg/kg)

All depths are reported in feet below ground surface

LOAEL-Lowest Observed Adverse Effects Level Based Benchmarks

[1] Test species = Mouse / Endpoint species = Cottontail Rabbi

NJDEP LEL - New Jersey Department of Environmental Protection
Lowest Effects Level in Guidance for Sediment Quality Evaluations for Freshwater Sediments.

NJDEP MSSCC - New Jersey Department of Environmental
Protection Most Stringent Soil Cleanup Criteria.

Bold indicates an exceedance of the MSSCC.

TABLE 9

Summary of Potential Chemcial Migration Pathways and AOCs

Southside Area Baseline Ecological Evaluation

Ingersoll Rand Co.,

Phillipsburg, New Jersey

	Area of Concern (AOC)	Contaminants of Concern	Closest Environmentally Sensitive Area (ESA)	Estimated Distance to Closest ESA (feet)	Evidence of Drainage Toward ESA	Is a Complete Chemical Migration Pathway Identified?
	Southside Area					
1/2	AOC 3A & 3B - Former Metal Chip Pads	PCB, Thallium	Wetland near Ephemeral Stream / Lopatcong Creek	2000	No	No
3	AOC 6 - Cameron Coolant Disposal Area	none	N/A	N/A	N/A	N/A
4	AOC 8 - Former 1,000 Gallon Gasoline UST	none	N/A	N/A	N/A	N/A
5	AOC 26 - Former 2,000 Gallon Waste Oil UST	none	N/A	N/A	N/A	N/A
6	AOC 29 - Old Landfill	TPHs, PAHs, PCBs, Metals	Wetland near Ephemeral Stream / Inverse Ponds	1200	Yes	No
7	AOC 37 - Ephemeral Stream	Arsenic	Wetalnds near Ephemeral Stream / Lopatcong Creek	0 - 1100	Yes	No

NOTES:

PAH = Polycyclic Aromatic Hydrocarbons

PCB = Polychlorinated Biphenyls

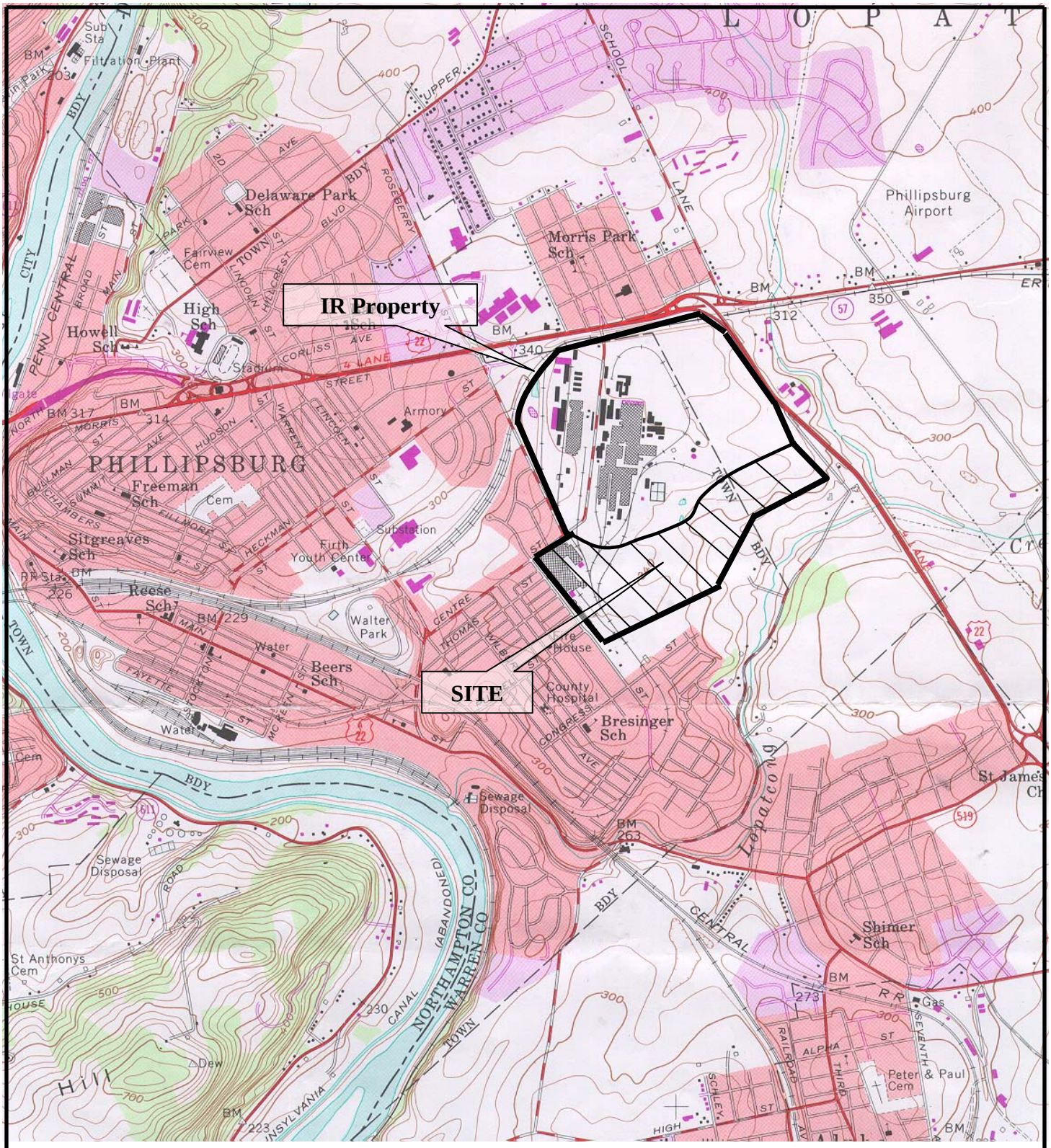
TPH = Total Petroleum Hydrocarbons

VOC +10 = Volatile Organic Compounds with a plus 10 forward library search (VOCs)

BN + 15 = Base Neutral Organic Compunds with a plus 15 forward library search (BNs)

PP Metals = Priority Pollutant Metals (Metals)

FIGURES



Site Location

Source:
USGS Topographic Quad
Easton, NJ-PA
(USGS,1956 – Photorevised 1968 and 1973)

Scale- 1:24000

Ingersoll Rand
942 Memorial Parkway
South-Side Area
Baseline Ecological Evaluation

Phillipsburg,
Warren County, NJ

FIGURE 1

ENSR® INTERNATIONAL

Legend

- Landfills
- Monitoring Well
- Recovery Well

PROPERTY OVERVIEW

INGERSOLL RAND COMPANY
PHILLIPSBURG, NEW JERSEY

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	01/17/02	3710-147-900

ENSR INTERNATIONAL
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DESIGNED BY:	REVISIONS			
GM	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
/jk				
CHECKED BY:				
APPROVED BY:				

FIGURE NUMBER: 2

SHEET NUMBER: 1 of 1

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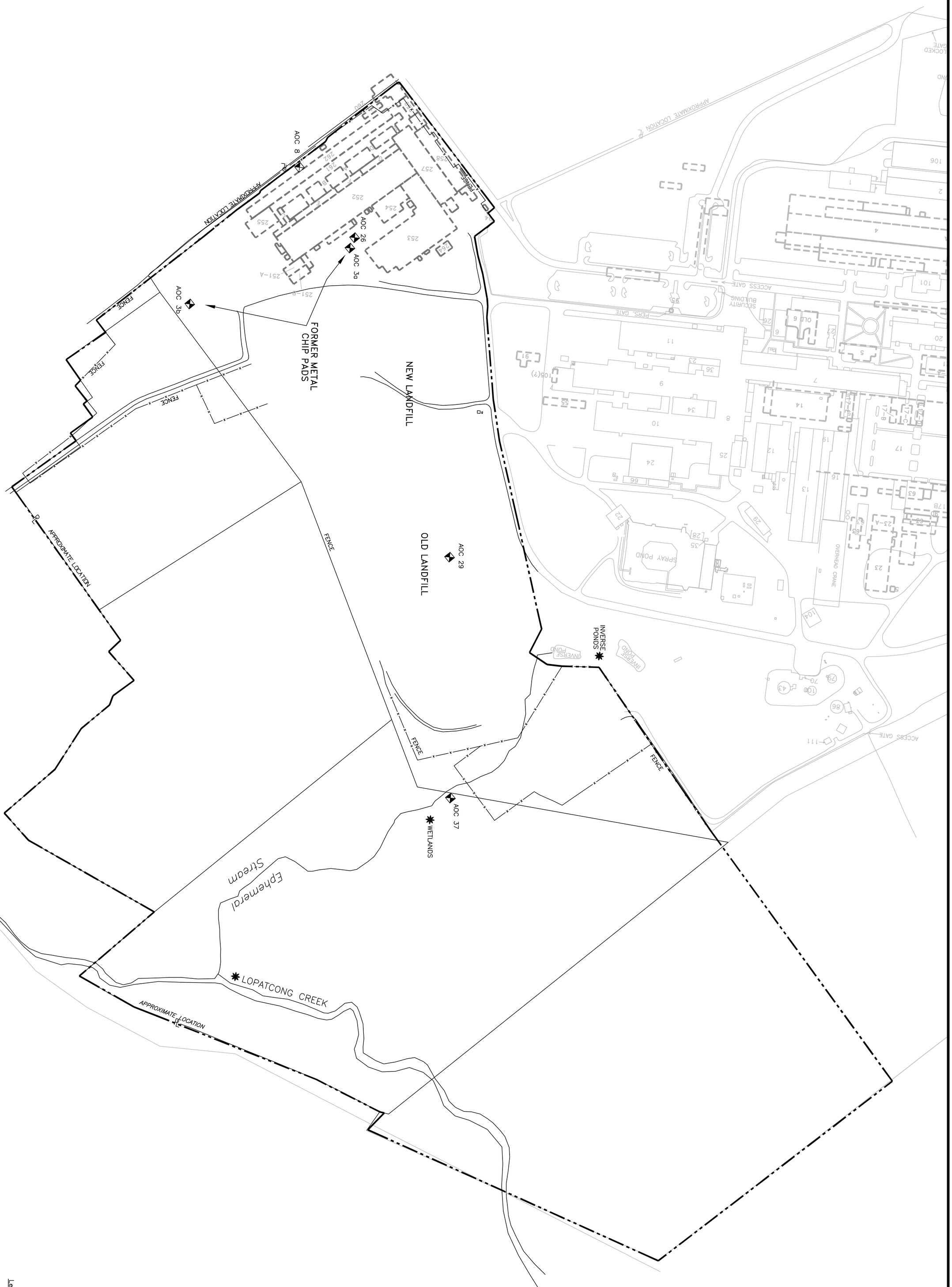
Plotted by on 'sepner2k2001(G)\Project\Ingersoll Rand\3710-153\Drawings\Site Plan

1000 500 0 1000

Scale in Feet



Legend

- SOUTHSIDE AREA OF CONCERN
- ENVIRONMENTALLY SENSITIVE AREA
- FORMER BUILDING FOOTPRINT
- APPROXIMATE LOCATION OF SOUTHSIDE AREA

NOTE: LOCATION OF AOC-6 IS UNKNOWN, BUT WAS REPORTED TO BE SOUTH OF AOC-3b

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FIGURE NUMBER: 3

SHEET NUMBER: 1 of 1

SOUTH-SIDE AREA DETAIL AND AOCs

INGERSOLL RAND
PHILLIPSBURG, NEW JERSEY

SCALE:	DATE:	PROJECT NUMBER:
AS SHOWN	06/06/02	3710-153-2.25

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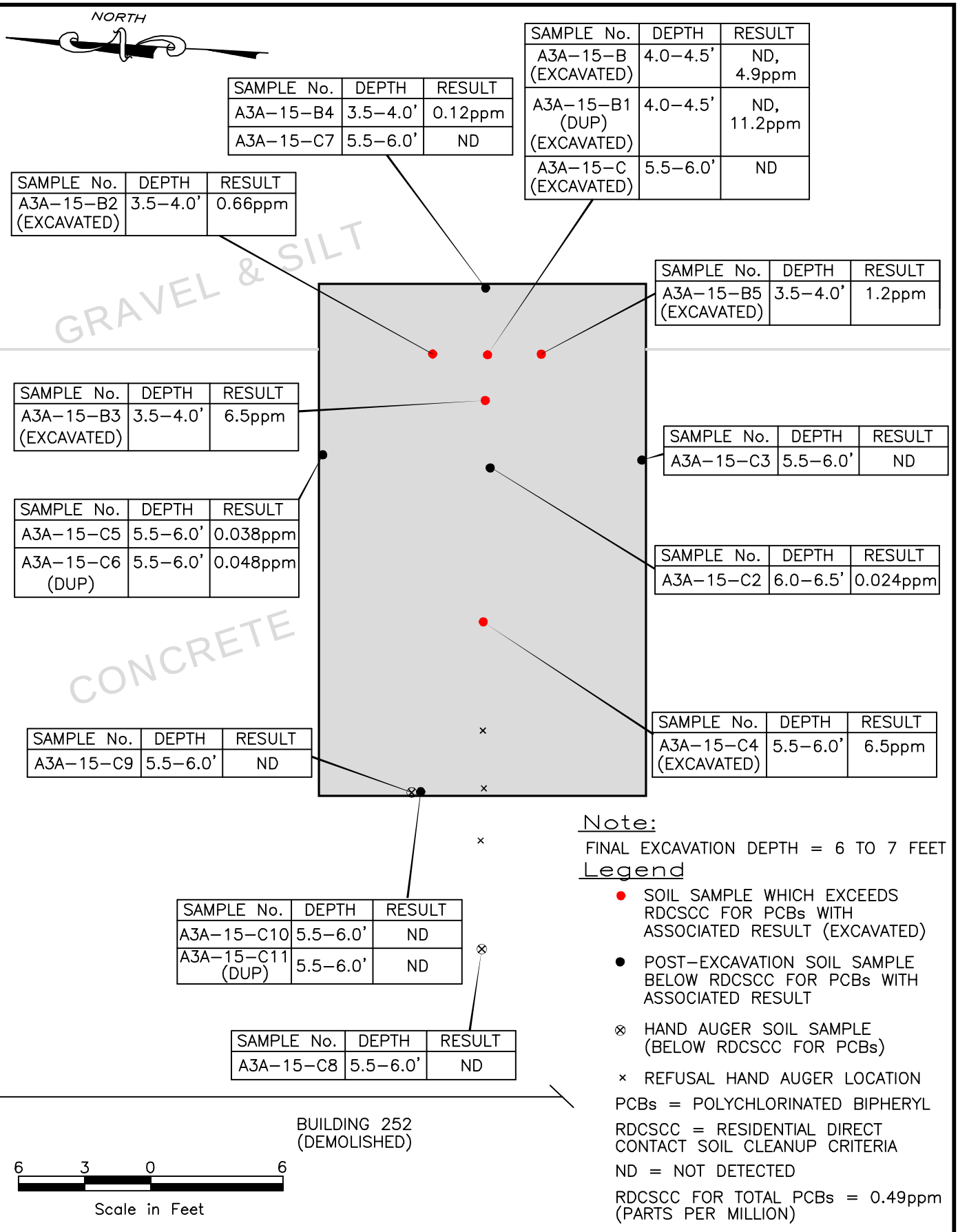
DESIGNED BY:	REVISIONS			
JS	NO.:	DESCRIPTION:	DATE:	BY:
DRAWN BY:				
/jk				
CHECKED BY:				
APPROVED BY:				

Piscataway on 'bdc-Piscataway'(J):Project/Ingersoll Rand/03710-153/Bee/Figures/Southside Area (1)



SAMPLE No.	DEPTH	RESULT
A3A–15–B4	3.5–4.0'	0.12ppm
A3A–15–C7	5.5–6.0'	ND

SAMPLE No.	DEPTH	RESULT
A3A–15–B (EXCAVATED)	4.0–4.5'	ND, 4.9ppm
A3A–15–B1 (DUP) (EXCAVATED)	4.0–4.5'	ND, 11.2ppm
A3A–15–C (EXCAVATED)	5.5–6.0'	ND

SAMPLE No.	DEPTH	RESULT
A3A–15–B2 (EXCAVATED)	3.5–4.0'	0.66ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–B5 (EXCAVATED)	3.5–4.0'	1.2ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–B3 (EXCAVATED)	3.5–4.0'	6.5ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–C3	5.5–6.0'	ND

SAMPLE No.	DEPTH	RESULT
A3A–15–C5	5.5–6.0'	0.038ppm
A3A–15–C6 (DUP)	5.5–6.0'	0.048ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–C2	6.0–6.5'	0.024ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–C9	5.5–6.0'	ND

SAMPLE No.	DEPTH	RESULT
A3A–15–C4 (EXCAVATED)	5.5–6.0'	6.5ppm

SAMPLE No.	DEPTH	RESULT
A3A–15–C10	5.5–6.0'	ND
A3A–15–C11 (DUP)	5.5–6.0'	ND

SAMPLE No.	DEPTH	RESULT
A3A–15–C8	5.5–6.0'	ND

Note:

FINAL EXCAVATION DEPTH = 6 TO 7 FEET

Legend

- ● SOIL SAMPLE WHICH EXCEEDS RDCSCC FOR PCBs WITH ASSOCIATED RESULT (EXCAVATED)
- ● POST–EXCAVATION SOIL SAMPLE BELOW RDCSCC FOR PCBs WITH ASSOCIATED RESULT
- ⊗ HAND AUGER SOIL SAMPLE (BELOW RDCSCC FOR PCBs)
- × REFUSAL HAND AUGER LOCATION

PCBs = POLYCHLORINATED BIPHERYL

RDCSCC = RESIDENTIAL DIRECT CONTACT SOIL CLEANUP CRITERIA

ND = NOT DETECTED

RDCSCC FOR TOTAL PCBs = 0.49ppm (PARTS PER MILLION)

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AOC-3A REMEDIAL EXCAVATION & POST EXCAVATION SAMPLING RESULTS

INGERSOLL RAND COMPANY
PHILLIPSBURG, NEW JERSEY

FIGURE NUMBER: 4

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
JK	06/06/02	3710–153	1 of 1

Piscataway on 'bdc–Piscataway'(J):Project/Ingersoll Rand/03710–153/Bee/Figures/A3A–EXCAV–DETAIL(1)

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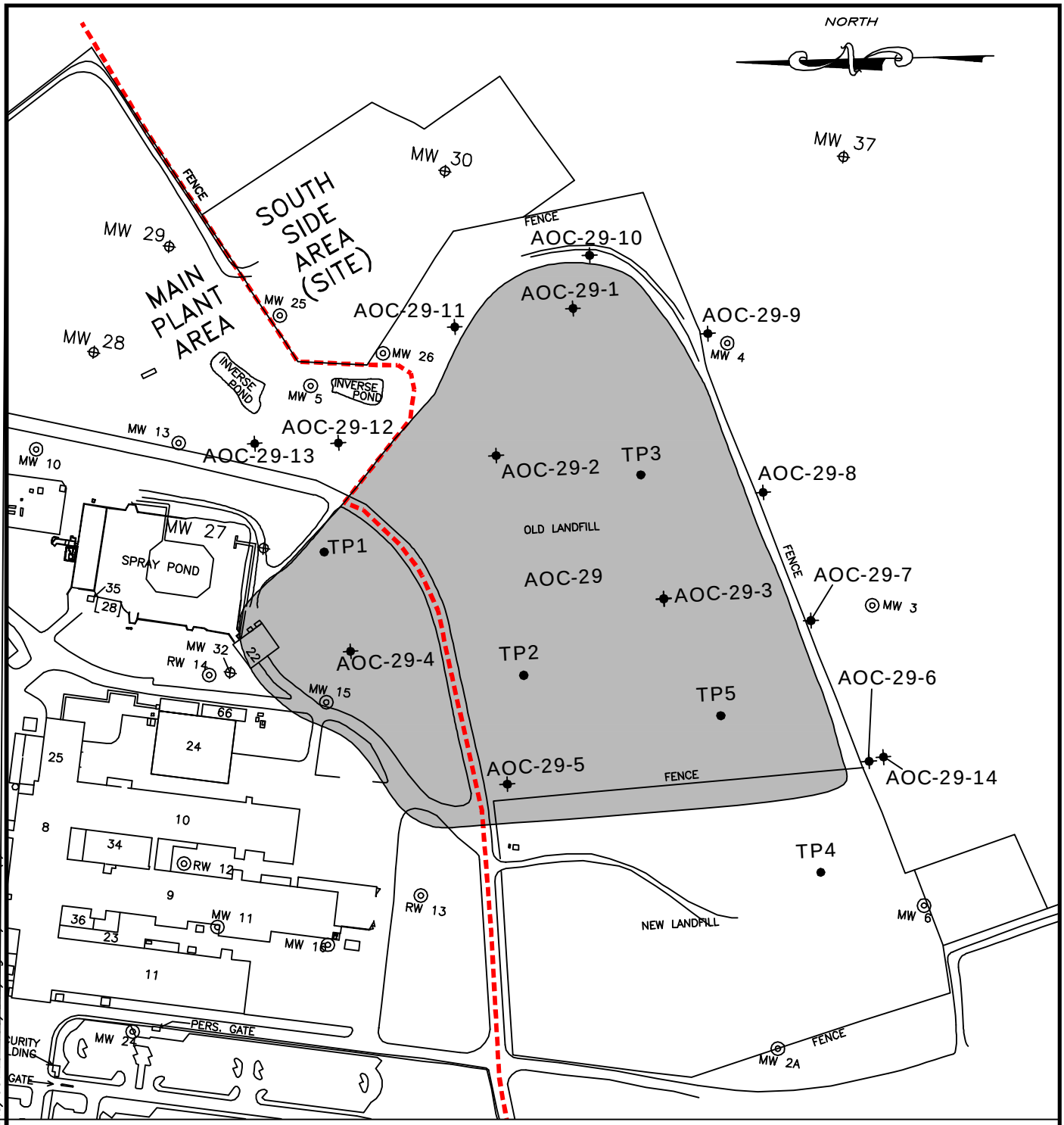

Legend

- SOIL BORING LOCATION
- TEST PIT LOCATION
- BOUNDARY OF SOUTH-SIDE AREA (SITE)

300 150 0 300

Scale in Feet

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OLD LANDFILL - AOC-29

SOIL BORING LOCATIONS
Ingersoll Rand

FIGURE NUMBER: 5

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
/JK	07/01/02	3710-153	

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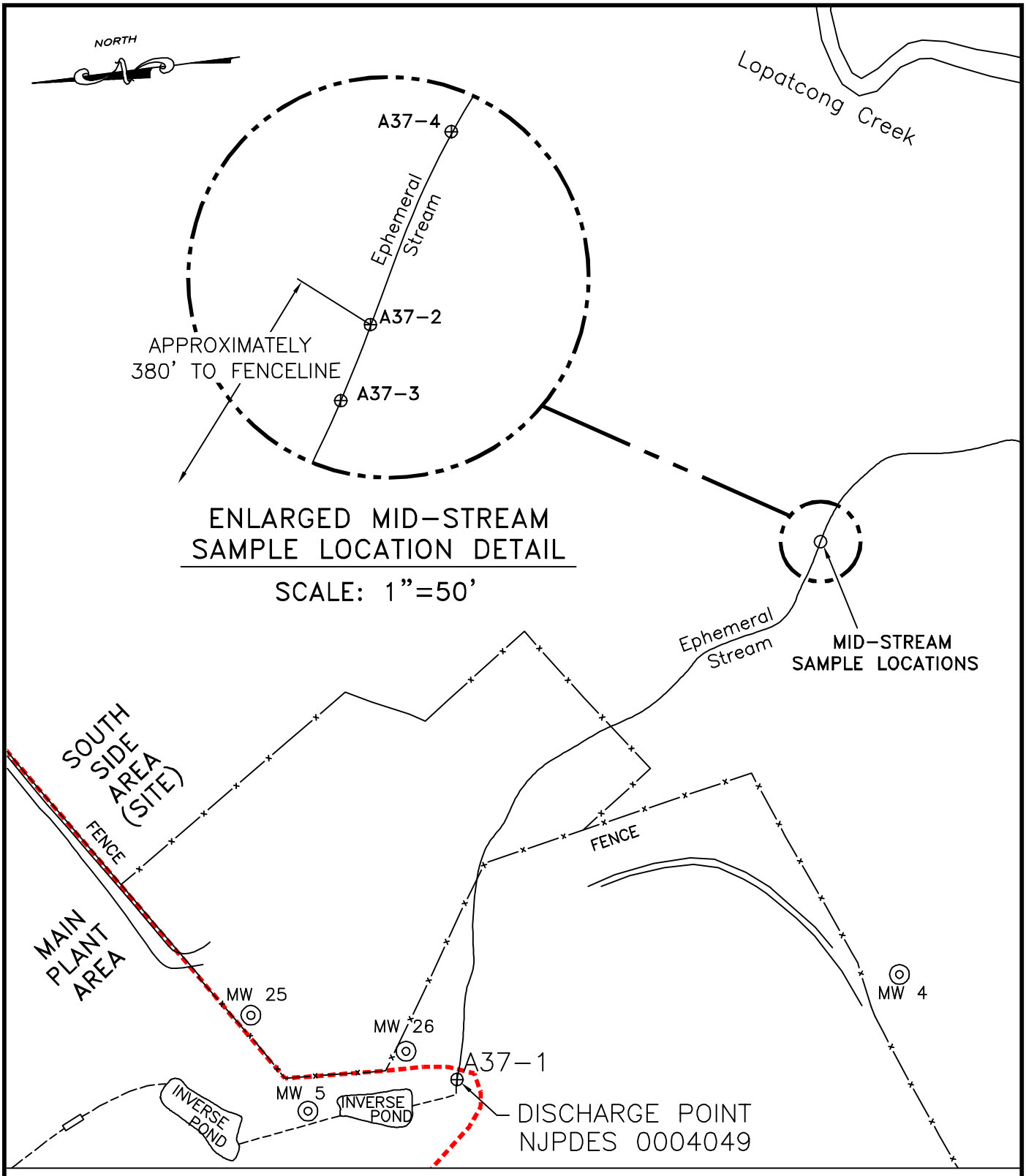
Piscataway on 'bdc-Piscataway'(J):Project/Ingersoll Rand/03710-153/Bee/Figures/AOC-29(f)



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SAMPLE LOCATIONS
AOC 37 - EPHEMERAL STREAM
INGERSOLL RAND COMPANY
PHILLIPSBURG, NEW JERSEY

FIGURE NUMBER: 6

DRAWN BY:	DATE:	PROJECT NUMBER:	SHEET NUMBER:
/JK	07/01/02	03710-153	

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Plotted on 'bdc-Piscataway'(J):/Projects/INGERSOLL RAND/03710-153/Bee/Figures/AOC 37 SAMP LOC(1)

APPENDIX A

Photos

Photo 1: Typical vegetation for overgrown fields in South-Side Area

Photo 2: Discharge point of lower Inverse Pond into Ephemeral Stream

Photo 3: View of concrete pipe which conveys the Ephemeral Stream below a dirt vehicle path approximately 250 feet south of the beginning of the Ephemeral Stream at NJPDES outfall 001A.

Photo 4: Typical onsite monitoring well

Photo 5: View looking south at the new landfill. Note the presence of PVC and corrugated plastic vents.

Photo 6: Photo looking southwest across new landfill. Note the two concrete pipes providing access to the landfill leachate collections system. The former metal chip storage pad is located in the background.

Photo 7: View looking northwest across new landfill. Storm water drain observed at the southern end of the landfill which connects to the rip rap boundary of the landfill.

Photo 8: Photo taken from downslope of old landfill overlooking corn field. Note: fence line covered with Tree-of-Heaven and residential homes in the distance.

Photo 9: View looking west-southwest across Lopatcong Creek.

Photo 10: Confluence of Ephemeral Stream and Lopatcong Creek

Photo 11: Former baseball field located at the southwest corner of the south-side area.

Photo 12: Typical vegetation observed in vicinity of former baseball field border at the south-southwestern boundary of the property.

Photo 13: View of boundary between cornfield and old landfill looking north. Monitoring well 3 is in the foreground.

Photo 14: Stormwater drain located in former Cameron Pump Area.

Photo 15: View of AOC 3B facing north, with Main Plant Area just out of frame to the right.

Photo 16: View from AOC 3A looking north towards Main Plant Area.

Photo 17: View looking north at stormwater drain located in former Cameron Pump Area. Main Plant Area in background.

Photo 18: View of Ephemeral Stream showing typically dense vegetation.

Photo 19: Typical vegetation observed near ephemeral stream.

Photo 20: View of Ephemeral Stream with large trees and dense vegetation, typically found along stream.